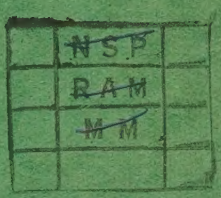
REPORT

OF THE

DEPARTMENT OF AGRICULTURE

1961

SIERRA LEONE GOVERNMENT



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P. B. Tatham, B.SC. (Agric.) Reading).

REPORT OF THE DEPARTMENT OF AGRICULTURE FOR THE YEAR, 1961

PART I—POLICY AND GENERAL REVIEW

In 1959 and again in 1960 mention was made of the need of a clear cut statement of government agricultural policy for Sierra Leone. A Government White Paper on Natural Resources was published in 1961. This paper covered the fields of agriculture, forests, fisheries and veterinary development.

2. The following quotation is from the Introduction to this paper.

> " With the approach of sovereignty close at hand, it is vital that there should be available a clear and agreed statement of the Sierra Leone Government's policy on the future development of the country's natural resources. This statement will cover an assessment of the potential prospects in the fields of agriculture, foresty, fisheries, and veterinary development.
>
> It is considered that such a statement is necessary if local farmers and fishermen are to be expected to increase their productivity and so make their all-important contributions to a rapidly expanding economy, and if foreign investment is to be encouraged.
>
> For it is only by creating conditions in which primary producers can enjoy an increasingly higher standard of living, that the general level of prosperity of the whole country can be raised.
>
> By embarking upon a policy which will place greater emphasis than heretofore on productivity, marketing and storage, and by making it possible to speed up the adoption by subsistence farmers of improved and up-to-date farming methods, Government hopes that the importance of land, which it is pledged to conserve and improve for future generations, will soon become apparent to all.
>
> It is also hoped that by placing this greater emphasis on production and marketing, Government will prove that active participation in farming, fisheries, and forestry can be more rewarding both spiritually and financially, than the present attractions of " white collar " work, or the dubious attractions of the diamond areas.
>
> Furthermore, by this change of emphasis, Government hopes that the purchasing power, and thus the standard of living, of the subsistence farmer and fisherman will be significantly raised."

3. Other extracts from the White Paper which refer in particular to the field of Agriculture are set out in Appendix XXVI.

4. As a result of the White Paper certain schemes were implemented, the most important of which was the Agricultural Loan and Credit Scheme Fund.

5. Most of the time was spent in finalising the administrative side of this project but by the end of the year the first Western Area Board Meeting had been held and funds totally £4,800 disbursed for the establishment of three poultry and two oil palm projects.

6. Meanwhile, the local poultry industry was expanding rapidly and it was plain that in spite of the opening of the new hatchery in the middle of the year at Newton demand was still ahead of supply.

7. The nucleus flock of Beltsville Small White Turkeys imported in 1960 proved to be very satisfactory and the first generation of poultry adapted themselves very quickly to local conditions. Demand for them is very high but no distribution of breeding stock was made during the year.

8. The detailed survey of the Rhombe Swamp area of the Little Scarcies was completed and plans were being drawn up for a comprehensive irrigation and drainage scheme to bring this rich block of 22,000 acres under cultivation. Naturally enough future development of the area will depend on the availability of funds but it is hoped that foreign capital can be attracted to develop this very large piece of land.

9. The distribution of improved seed rice through the " Master Farmers Scheme " continued with varying degrees of success. A great deal depends on how carefully the crop is rogued. A short course of instruction was held at Rokupr to bring Agricultural Instructors up to standard on modern techniques.

10. The contract ploughing service is now an established fact and in spite of a drop in the acreage cultivated when payment in advance was introduced, recent reports show that the acreage ploughed is reaching an all time high record. The use of fertilisers is also part and parcel of the scheme; not only so but farmers are beginning to appreciate the advantages of fertiliser application on both tree and cash crops.

11. Agricultural production in 1961 again showed a small increase. There was a large increase in Benniseed exports but a slight drop in those of Cocoa and Coffee. There was also a slight increase in Palm kernel production and in Sulima piassava. The main problem in crop production lies in getting farmers to accept lower prices for their produce when world prices are low as well as enjoying high prices when produce is in short supply. They soon become despondent when prices fall and would rather be inclined to neglect plantation and crops than to persevere with greater effort and thus improve production from the same area of land. As pointed out in last year's report any marked drop could have very serious adverse effects on the country's economy. The Agricultural Loan and Credit Fund Scheme plus guaranteed prices might help farmers to change their " not worth the trouble harvesting " attitude. Efforts were still made to attract outside capital for the development of new crops. The Aureol Tobacco Company continued with their leaf growing project in the North and the consortium of companies interested in banana production continued their investigations in the Torma Bum area. Rubber clones were maintained and multiplied and some experimental work on latex extraction was done in South Western Circle.

12. The Headquarters at Njala continued to operate but preparation was made for the transfer of all the Administrative Staff to temporary Ministerial quarters in Freetown.

13. A large number of visitors were as usual entertained at Njala including many F.A.O. experts and others from research and technical organisations.

14. The highlight of the year was the visit of Her Majesty Queen Elizabeth II and H.R.H. Prince Philip, Duke of Edinburgh to the Royal Show at Kenema.

15. Many members of the staff were actively engaged in preparing the site and preparing innumerable exhibits for this historic occasion which it can be recorded with pleasure, passed with the greatest of success.

To sum up, the year was one of steady progress with emphasis on the strengthening of schemes already implemented.

A.—The Provision of Adequate Food for the People

16. *Rice*—There was a slight fall in the production of upland rice because yields were lower than those of last year. Yields from swamplands were higher than last year and in addition a greater area of swampland was cultivated. The imports of rice during the year were greatly reduced, and only reached 4.108 tons valued £209,626 against 28,592 tons valued £1,237,279 imported in 1960. No imports should be necessary in 1962, now that the two mills at Torma and Kissy are in operation.

17. Mention has already been made of the renewed interested in Mechanical cultivation of rice which suffered a minor set back on the introduction of a system of payment in advance.

18. The following table shows the acreage ploughed since 1951. In 1949 and 1950 four acres and 282 acres respectively were ploughed in the Southern Circle:—

District	*Year*										
	1951	*1952*	*1953*	*1954*	*1955*	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*
Southern Circle	282	465	1,178	2,278	4,073	5,530	5,302	4,346	4,389	5,508	6,945
North-western Circle	80	645	685	757	1,014	2,008	2,334	320	243	592	690
South-western Circle	32	719	1,018	1,012	1,173	1,484	1,606	1,015	600	680	—
Northern Circle	—	238	915	2,449	3,600	2,819	2,625	1,504	356	926	1,494
North-eastern Circle	—	30	163	127	141	250	160	206	319	594	721
Western Area	—	—	—	4	65	—	—	44	21	50	37.5
TOTAL	394	2,097	3,957	6,627	10,066	12,091	12,027	7,435	5,928	8,350	9887.5

19. Further progress was made with the Water Development Scheme on the Great Scarcies; 1,100 acres were reclaimed during the year bringing the total to 2,400 acres.

20. The survey of the Rhombe swamp on the Little Scarcies, which commenced in 1960, was completed during the year. Of the total area of 22,000 acres, 16,000 acres have been contour mapped at one foot intervals. This will allow for the designing of an accurate drainage system.

21. Salinity testing in the Little Scarcies, Ribbi and Bumpe Rivers was the chief investigational work carried out. A suction dredger was received and assembled during the year but was not commissioned until 1962.

22. Fertilisers, especially Superphosphate were still popular in the North and sales were encouraging. The value of fertilisers for increasing yields in other crops is now being recognised.

23. *Other Food Crops.* No great change in the production of other crops occured but an effort was made to persuade farmers to increase their output of Maize, Guinea Corn and Pigeon Pea as a means of providing local foods for the growing Livestock Industry.

24. Supplies of exotic and local vegetables in the urban areas of large towns continued to improve. The onion growing scheme at Mahera progressed satisfactorily. The number of active growers increased from 41 to 59. It is estimated that the yield of onions 1961/62 season will be in the region of five tons compared to ten hundredweights produced last year.

25. *Livestock—Cattle.* There was little change in marketing facilities so the previous problems remained largely unsolved. An organised marketing system, as emphasised in the 1960 report, must function if progress is to be made in this branch of the industry.

26. *Pigs.* The pig industry made little progress during the year but the same number of stock was sold as in 1960. Feeding stuff still present a proolem. Supplies from the Rice Mill, Cline Town are erratic in terms of quantity and quality. Importation of animal feeding stuff continued to rise thus indicating the desire of stock keepers to provide a good quality balanced ration for their animals.

27. *Poultry.* Poultry keeping again made rapid strides and as in previous years demand, especially for young stock, was greater than supply, 18,686 birds were sold from the various agricultural stations, of which 11,000 were sold as day old chicks. This is almost double the production of last year.

28. The new hatchery was in operation by mid 1961 but due to many teething troubles, particularly the breakdown of the electric generators both engines of which broke down after less than 500 hours in work, production of day old chicks did not reach the high number anticipated.

29. Importation of pedigree day old chicks and pedigree stud cockerels was continued to bring the numbers up to that required for implementing the breeding programme.

B—The Cultivation of Cash and Export Crops

Appendix I sets out the comparative figures for agricultural exports in recent years.

30. *Cocoa.* Exports for the Calendar year were down by nearly 460 tons from the record crop produced in 1960 but production was still well above that of 1959. The export value per ton fell from £214 to £167 thus reducing the total value exported from £696,129 to £463,941; a drop of over £232,000. It is expected that prices will now stabilise themselves in the region of £165/ton. Quality remained high with over 99 per cent of the exports classed Grade I.

31. The modified detailed survey of the cocoa growing areas was continued and much valuable information on the extent of virus infection, Capsid attack and Black pod disease was accumulated. The proportion of land areas under permanent tree crops and farm crops were also assessed. In the area surveyed, 87,966 acres, 10 per cent of the land is occupied by coffee and 5 per cent by cocoa plantations.

32. Three outbreaks of Gandorhun and four of Giehun were discovered, bringing the total discovered since the beginning of the modified survey to four Gandorhun and twenty-one Giehun. The control scheme for Black pod disease was continued but was rather hindered due to the breakdown of essential supplies of spare parts for spraying machines and necessary chemicals.

33. Monkey drives were continued in the main areas of Kenema, Pujehun and Bo districts. 37,017 of the pests were killed; 13,240 in Kenema, 18,927 in Pujehun and 4,850 in Bo.

34. From the Amazon cocoa pods received from W.A.C.R.I. in 1960 a total of 30,890 seeds were raised and sold or distributed to farmers, District Council and other Agricultural Stations.

Export duty on cocoa was 7.5 per cent plus 1 per cent ad valorem.

35. *Coffee.* The export of coffee was only seventy tons below the record crop of 1960. The average value per ton continued to fall, thus reflecting the fall in world prices which have become progressively lower. Export value was in the region of £119 per ton. The total export value of the 1961 crop was £596,239 for 5.023 tons compared to £649,491 for the 1960 crop of 5.093 tons.

36. Farmers are re-acting to these low prices and many coffee plantations were neglected or totally abandoned during the year. More stringent grading methods have been introduced because it will be difficult to maintain a place in the competative world market unless standards are maintained at a very high level.

37. *Palm Kernels.* Production of kernels rose during 1961 to 57,764 tons. The export value was well down when compared to the £54 per ton obtained in 1961. The Sierra Leone Produce Marketing Board maintained the producer prices at £30 14*s.* and £27 5*s.* respectively but these changes did not materially affect increased production.

38. Planting were continued at Sahn and Kasse and initial work was started on the plantation at Mange Bure. The Production Division of the Sierra Leone Produce Marketing Board took over the supervision of the 2,000 acres and 1,000 acres respectively oil palm plantations at Masanki and Waterloo which formerly were run by the Department of Agriculture.

39. *Palm Oil.* No imports of palm oil were necessary during the year.

40. *Ginger.* The production of ginger rose slightly duirng the year to 39 tons above the 1960 figure. The export value per ton also rose from £133 to £136.

41. *Kola Nuts.* Production dropped during the year from 1,371 tons valued £149,833 produced in 1960 to 959 tons valued £99,087; the unit price per ton falling from £109 to £103.

42. *Piassava.* Exports of Prime Sherbro dropped from 640 tons to 475 tons. The price per ton rose from £68 to £72. Sulima Piassava production rose from 5,163 tons to 5,257 tons. The price per ton rose from £44 to £48 per ton.

43. *Beeswax.* The increased production reported in 1960 was not maintained but fell to 47 tons with an export value of £16,249. The unit value also fell from £408 to £345 ton.

C—Soil Conservation

44. No practical solution to the sheet erosion problems resulting from the traditional shifting cultivation method of farming on the uplands was evolved.

45. As in previous years the whole policy of the department has been to preserve and improve the fertility of the soil. To this end the extension of the development of the inland, saline and mangrove swamps received continued attention in an effort to relieve the pressure of farming on the high lands, which are so liable to damage from over-farming and erosion.

D—The Quality of Agricultural Produce

46. The very high standard of the country's export produce was maintained and in the case of coffee, improved—a most satisfying feeling in these days of fluctuating world prices and markets.

47. There is still much room for improvement in the rules governing coffee standards and it is hoped the regulations will be amended to bring them into line with those in existence in other coffee producing countries.

E—Staff Training and Agricultural Education

48. The established courses for Agricultural Instructors-in-training held at Njala Training College continued to be held. Twenty-one students, of which five were Gambians were in session at the College. Short courses for Commercial people were implemented and thirteen applicants attended.

In addition, twenty-eight potential students were serving a practical pre-college year on out stations.

49. Of those on overseas training courses, A. U. Beckley and S. S. Jackson returned to take up posts as Agricultural Superintendents. W. E. Taylor who was studying for his B.Sc. (Entomology) successfully passed his examination but remained in the United Kingdom for post graduate study. Mr. I. May-Parker commenced his three years study at Reading and Mr. E. A. Robinson completed his first year at the same college where both are reading for B.Sc. (Agric.) Mr. O. M. Cole completed his one-year practical course and proceeded to Wye College to start the first year of his degree course.

50. Messrs. Attere-Roberts and Sama, Adi-Pratt, and Miss S. E. Lamboi continued their studies at the West of Scotland Agricultural College. Messrs. Brown, Knox and Pujeh returned from Israel after a successful period of intensive training in poultry production and citrus growing.

51. Mr. D. A. L. Davies completed his training in the United Kingdom and returned to take up the post of Agricultural Engineer.

Two students—Messrs. Maturi and Pessima, proceeded to Australia to read for the degree of B.sc. (Agric.)

F—Research

52. Details of the work carried out by the West African Rice Research Station at Rokupr are given on the Annual Report of the station published separately.

53. Work at the sub-station of the West African Institute for Oil Palm Research at Njala continued for the greater part of the year under Mr. I. Osayi who was sent up from the main station at Benin. Later in the year Mr. Tatham took over the running of the station. The details of the work of the station are given in the annual report of the Institute.

54. For a considerable period of the years work in the Plant Pathology section was limited due to the vacancy caused by the incumbent proceeding on vacation leave and on his return resigning his post for work with the Nigerian Government.

55. The Systematic Botanist worked on a vegetation survey of the Bolilands, and some classification work on Bananas. Other work undertaken included a study of the ecology of the Musaia Grasslands and an investigation into poisonous plants of Sierra Leone. The latter in co-operation with the Veterinary Department.

56. As a result of investigations into the severity of capsid attack, a scheme for the large scale implementation of a treatment recommended by the Entomologist was derived. Details of the treatment are given in the appropriate section of this report.

57. Work also continued on other coffee and cocoa pests. The Agricultural Chemist continued fertiliser experiments mainly on cassava, rice and groundnuts, and carried out two semi detailed soil surveys, and a quick 'look see' survey on the site intended for the establishment of a large oil palm plantation at Mange Bureh.

G—General

58. 1961 was a very satisfactory year, and although a great deal of expansion of the activities of the Department did not take place, schemes already implemented were consolidated and placed on a sound footing.

59. The completion of the "Boliland Soil Survey" and that of the "Rhombe Swamp" will allow detailed plans to be drawn up regarding their future development.

60. The mechanical cultivation of rice is now very much an established fact and is part and parcel of the agricultural system practised in the Northern and Southern areas of the country.

61. Experimental work on coffee and cocoa, including the spraying scheme made sound if not spectacular progress. The cocoa virus survey also gave satisfactory returns and on the information collated will allow future plans to be drawn up, for improving the crop and production from these areas. The Kenema Rural Institute and the F.A.O. Soil Survey team should also bring great benefit to the Kenema District when they get under way.

62. All in all it was a very satisfactory year. The publication of booklets, pamphlets and Agricultural Notes was continued—the important contribution being one on the Cultivation of Cocoa.

63. Departmental Staff attended various conferences throughout the year. One of the highlights of the year was the visit of Her Majesty Queen Elizabeth II and H.R.H. Prince Philip the Duke of Edinburgh to Sierra Leone in and in particular their visit to the Royal Show at Kenema. They were conducted round the Show by J. M. Dent, Director of Agriculture, A. K. Murray, Principal Agricultural Officer, R. A. Murfitt, Agricultural Officer and J. O. Palmer-Davies, Agricultural Superintendent. It was a most successful show and thanks are due to the officers of the department who worked so hard to ensure its success.

64. In conclusion, I wish to pay tribute to all members of the staff for the very hard work expended in achieving so much and ensuring the success of the work of the department during the year under review.

J. A. C. DAVIES,
Director of Agriculture.

PART II—THE WORK OF THE DEPARTMENT OF AGRICULTURE

A—Organisation and Staff

65. There were several changes of staff during the year. Messrs. R. S. Liney, Senior Agricultural Officer, D. S. Garvie, Irrigation and Drainage Engineer and S. A. Rahman, Secretary, retired during the period under review.

66. A. R. Stobbs, Soil Surveyor completed his contract and retired in January. Messrs. S. A. Jabati, Agricultural Officer, R. A. Stewart, Agricultural Engineer, J. F. F. Glass, Agricultural Superintendent (Mechanical) and C. R. Elliot, Temporary Agricultural Superintendent (Mechanical) were seconded for special duties to the Sierra Leone Produce Marketing Board, Road Transport Department and Co-operative Department respectively.

67. Mr. A. R. Siafa, Agricultural Superintendent was promoted to the post of Agricultural Officer, and A. K. Murray, Senior Agricultural Officer to the post of Principal Agricultural Officer. In addition Mr. W. Macnab, Agricultural Officer and H. E. G. Morgan, Agricultural Officer were promoted to the post of Senior Agricultural Officer in April and July.

68. A. U. Beckley and S. S. Jackson were promoted to Agricultural Superintendents in September and November.

69. There was a welcome intake of two new Agricultural Officers to Sierra Leone in August, namely Mr. I. McMartin and Mr. R. A. Dingle. A. F. Higginson, Temporary Agricultural Superintendent was also a welcome addition to the Horticultural Staff.

Experimental Station, Njala:

70. Experimental work continued at Njala. New equipment obtained included an electric calculating machine. A review was made of the records of previous experiments and detailed histories of each farm block were compiled. All experiments were entered in log books.

71. *Citrus.* Harvest and yield recording of the 1961–62 crop commenced at the end of October. The scab disease reported last year did not re-occur. A heavy dressing of fertilizer was applied on the advice of a visiting F.A.O. expert. Each tree received 23½ lb. of a mixture of 500 lb. Sulphate of ammonia, 333 lb. Superphosphate and 380 lb. Sulphate of potash in two applications early in July and in late August. It is now considered that this treatment was excessive and wrongly timed. 15 Satsuma orange trees in block 36 were replaced with tangerines.

72. *Coffee.* Yields were very low on all blocks and few trees produced worthwhile crops as the following table shows:—

Blocks	*No. of Trees*	*No. of Trees cropped*	*Yield lb. wet cherry*
12	462	87	265
16A	302	82	404
25	508	68	261
33	438	48	110
Excelsa	—	—	181

73. An experiment designed to test the effect of mulch, fertilizer and fertilizer/mulch on robusta coffee was laid down on block 12 and repeated on block 17. Marked differences in growth were noted between mulched and unmulched plots presumably due to the effect of the severe dry season on the unmulched plots.

74. Blocks 25 and 23 received 3 cwt. of a 1:1:2 NPK fertilizer mixture. Block 16A., the Excelsa and Liberica coffee blocks were dressed with a 2:1:1 mixture at 7 ozs. per tree.

75. 94 Rooted cuttings of Robusta coffee varieties were planted in August in block 46. Cuttings included high yielding Njala selections as well as imported varieties. Vegetative propagation from high yielding trees continued at the end of the year.

The bananas planted in half of Block 33 made very poor progress.

76. *Rubber.* A dressing of 2½ lb. per tree of a NPK Mg mixture in the proportions 100/184/80/50 was applied in October. 164 successful buddings of BD5 and Harbel 1 were made on Tjir 1 and Tjir 16 stock plants. These will be used to extend the budwood garden.

77. *Mango.* The varieties now growing on the station are Palmer, Erwin, Kent, Lippons, Zill, Aroomanis, Divine, Peter, Smith and Njala varietes. A large number of seedling mangoes have been established in the nursery for future budding.

78. *Pineapples.* The control of Centrosema among the pineapples in blocks 20, 28 and 37 was very costly. Chemical control will be carried out next year. A large number of fruits developed a form of internal rot before harvest. An experiment was designed to test whether this defect could be controlled by the use of fertilizer and borax.

79. *Pasture and Fodder Crops.* 1 cwt. per acre of su'phate or ammonia was broadcast in April on blocks 9 and 15 which carry Pangola grass. Later a mixed fertilizer was applied at 3 cwt. per acre. Guinea grass, was maintained on blocks 42 and 43. Pueraria was maintained as a cover crop on blocks 5, 36, 44 and 45.

80. *Other Field Crops.* Benniseed was grown on block 27. A fertilizer was borrowed in and followed by the broadcasting of 15 lb. of seed. but at the time of flowering the crop was attacked by a fungal disease and did not yield. Guinea corn was grown on block 18. 300 lb. of mixed fertilizer was harrowed in and followed by the broadcasting of 15 lb. of seed. 920 lb. of seed was threshed from the block which also yielded 17 000 lb. of straw. The crop was seriously damaged by birds because it was not possible to provide "bird-boys". Maize was planted on blocks 13 and 26 at a spacing of 3′ by 2′ on the flat. The local seed planted contained a mixture of early and late varieties. A total of 733 lb. of dry cobs was of early and late varieties. A small trial was carried out with ten varieties of short duration hybrid maize from Israel.

81. *Livestock.* The Ndama cattle were transferred to Musaia. 142 piglets were born. 22 pigs were sold for breeding, 14 for fattening, 32 transferred to other stations and 25 slaughtered for pork.

Experimental Station, Newton:

82. *General.* Work continued along the same lines as in previous years. Work on crops was largely directed towards maintenance; vegetable cultivation in the East Valley was discontinued as pilfering became a serious problem and the revenue derived from the area did not justify the expenditure.

83. *Cattle.* The grazing at Waterloo plantation consisted almost entirely of Lalang and as a result, the cattle did not do well. The health of the herd was satisfactory but they showed few signs of putting on weight and the calving percentage was very low.

84. When Waterloo Oil Palm Plantaion was tranferred to the Sierra Leone Produce Marketing Board, it became obvious that, with the extension of the poultry section at Newton, there would be insufficient buildings or grazing to enable the herd to be retained; consequently the breeding stock was transferred to Musaia and the bullocks sold locally.

85. *Pigs.* In general, the health of the pigs was satisfactory apart from two cases of abortion and the death of two gilts from suspected Trypanosomiasis. Litter sizes were disappointing and although the average number born alive was 9.05 pre-weaning mortality was 30 per cent. In many cases, this appears to have been due to the sows being old and producing little milk.

86. The demand for Large White pigs remained heavy and 157 were sold; 25 fewer than in 1960. Many of the weaner gilts sold off the station to local farmers have been slaughtered for pork. To stop this waste of breeding stock, it was decided to rear gilts up to maturity and then to sell them in-pig.

87. *Poultry.* At the end of the year there were closed flocks of Rhode Island Reds, Light Sussex and Golden Legbars. A small open flock of Rhode Island Reds is being maintained until the other flocks are built up sufficiently to meet the capacity of the incubators. The trap-nested stock of Light Sussex and Golden Legbars were 500 days old in mid-September and from them the second year breeders were selected. Hen-housed

averages for the best sire families were 171 for Golden Legbars and 147 for Light Sussex. These low figures are due in part to a high mortality of birds in lay.

88. Ten pedigree Rhode Island Red cockerels were imported and were mated to first generation Fairbairn imported stock. Seven pens were made up and 70 sire families will be available for testing in 1962.

89. Egg production for the year was 150, 130 of which 61,385 were incubated and 78,882 were sold for table use. The commissioning of two Secula Mammoth incubators with a total capacity of over 16,000 eggs heralded a new stage in the progress of the poultry industry in Sierra Leone as not only was the incubating capacity multiplied by eight but both fertility and hatchability in the new incubators was approximately 10 per cent higher than the previous best. It is interesting to note that, whereas the average fertility was calculated as 75.6 per cent for the year, a test done at Fourah Bay College found that 95.6 per cent of the eggs were fertile; but at 13 days, the percentage dead germs was 31.8 per cent of fertile eggs. This experiment was conducted on eggs which had been held at room temperature for a week before being incubated and it would appear that a large number of eggs being classed as infertile actually contain germs which have died at an early stage. It may be found, when an air-conditioned eggs room is avai'able, that it is possible to cut down this high percentage of early deaths.

90. The demand for young stock increased and 10,939 day old chicks were sold in the Western Area and a further 2,236 transferred for rearing at other stations. 5,511 were distributed at six to eight weeks old. A large proportion of the early hatches had to be retained at Newton to build up the breeding stock and it was only towards the end of the year that these birds came into lay.

91. No feeding trials were done during the year, because with the increase in flock size, it was found that it was more convenient to standardise on rations based on BOCM Supermixes.

92. *Ducks.* As the demand for ducks eggs was low, it was decided to dispose of the Khaki Campbells. A considerable number of stock was sold for table use but requests for breeding stock were few. All eggs were hatched under ducks.

93. *Turkeys.* Forty-four young birds were sold to interested farmers. Ninety-seven nature birds were sold for the table, mainly during the Independence Celebrations but it was found that imported oven-ready stock were more popular. The health of the flock gave cause for concern and both Fowl Pox and Newcastle Disease were diagnosed. Towards the end of the year, a few birds died from some unexplained cause and investigations by the Veterinary Department continue.

94. *Rabbits.* Sales continued to fall off and, in view of the poor demand, the stock was transferred to Njala.

95. *Model Holding.* The house of the model-holder was re-roofed during the year but, as further repairs are necessary, the tenant was not resident. It was not considered desirable to cost the enterprise until he takes up residence and devotes his attention to the project. It is unfortunate that, for the last ten years the calibre of tenant has not been high and as a result the holding has not been run efficiently.

96. *Oil Palms.* Individual tree recording by the West African Institute for Oil palm Research staff continued and apart from the harvest from block I, which was retained by the tenant of the model-helding all fruit harvested was sold. The yields of all blocks were less than last year because no fertilisers were applied. Block yields were:

Block No.	*No. of Trees*	*Type*	*Bunches*	*Total bunch Weight in lb.*
1	302	Angola	1,054	13,015
6	141	Angola	448	6,379
11	204	Angola	350	4,900
19	1,873	Nigerian and Deli	3,808	66,085
21	600	Nigerian	1,321	18,237
Border Palms	70	Angola	210	4,836

97. *Citrus and Avocado Pears.* Routine maintenance was carried out; a total of 4,216 pears were harvested. The mixed citrus plots were maintained and dressed with fertiliser.

98. *Coconuts.* Routine maintenance was carried out and each tree received 6 lb. of an N.P.K. Mg. mixture. In spite of regular maintenance and fertiliser applications over the last two years few trees are yet in bearing.

99. *Pineapple Fertiliser Trial.* The trial laid down last year started to yield; the following tables gives the yields to date:

Treatment	*No. of fruits*	*Average weight of fruit*	*Average crown length (inches)*	*Date of 1st harvest*
NPK ...	115	8.2	6.2	29–7–61
N ...	170	4.2	7.8	5–7–61
P ...	10	7.5	6.6	23–11–61
K ...	25	6.0	7.0	10–10–61
Control ...	75	8.7	6.0	5–7–61

100. *Cassava Fertiliser Placement Trial.* This was laid down in 1959 and was harvested during the year. The following yields were obtained:—

Plot No.	*Plot Size*	*Treatment*	*Yield Tubers*	*Yield per Acre*
1 ...	0.25 acres	PK	1944 lb.	69.5 cwt.
2 ...	0.25 „	P	1749 lb.	62.5 „
3 ...	0.25 „	K	3164 lb.	113. „
4 ...	0.25 „	Control	1328 lb.	47.3 „

The treatment were as follows:—

PK —2 cwts. of a 1:1 mixture per acre
P —1 cwt. Superphosphate per acre
K —1 cwt. Sulphate of potash per acre.

101. *East Valley.* This section was run down during the year. All work on pineapples was transferred to Block 18. Pilfering was a serious problem and it was decided to close down the vegetable garden. Radin China 4 rice was grown in the swamp and yielded 1,176 lb. of paddy per acre. This rice will be sold to Master Farmers in 1962 for seed production.

Animal Husbandry Station, Musaia:

102. *Cattle.* Bulls were removed from the breeding herds during the first week of May and returned to the herds on the 1st November. Calves were therefore born in the late rainy season and early dry season. This reversion to the natural calving season has led to improved calving intervals, and better conception rates despite theoretical considerations to the contrary.

103. One hundred and six cows calved during the year with an average calf birth-weight of 34.6 lb. Sixty-eight calves were weaned during the year with an average weaning-weight of 215 lb. Average weights showed a considerable increase on recent years and reflect the improved standard of health of the herd. This can be directly attributed to the completion of the fencing programme and to rotational grazing which can now be practiced.

104. The herd increased from 235 to 354 during the year and increases apart from births were due to purchasing 8 heifers and obsorbing the Njala and Newton herds. Twenty-one animals were sold realising £285; 15 animals of all ages died.

105. Routine inoculations against Rinderpest, Anthrax, Black quarter, Contagious abortion and Haemorrhagic septicaemia were carried out, Suckling calves were dosed at monthly intervals with Piperazine adipate. Mature stock were dosed three times during the year with Minel.

106. Calves received supplementary feed from mid-February until the rains started. Initially the quantity consumed was small but latterly consumtion was about 1 lb. per calf per day. The food was placed inside a creep where water and shade were available. Three different rations were tried:

i. 98 lb. rice bran *ex* Cline Town (6/- per bag)
1 lb. common salt
1 lb. minerals;
ii. 99 lb. rice bran *ex* Makeni (3/- per bag)
1 lb. common salt;
iii. 88 lb. rice bran *ex* Cline Town (6/- per bag)
10 lb. groundnut cake
1 lb. common salt
1 lb. minerals.

107. No difference in growth rates of the three groups was observed.

108. Silage was fed to the stock from mid-February. Initially it was not eaten but after sprinkling molasses and salt on it for a few days it was eaten without additives. The silage was made in a pit from Yanni grass (*Axonopus africanus*) and Cowpea (*Phaseolus vulgaris*).

109. *Sheep.* The sheep herd increased from 95 to 153 with 108 births and 27 deaths of which 10 were still-births or weaklings and 5 due to plant poisoning. Twenty-two sheep were sold during the year.

110. *Poultry.* The poultry section had a disappointing year. Production was increased but not all the eggs or 8-week old chicks produced could be sold. The activities of the section were therefore reduced late in the year. 1,774 chicks were hatched and 533 received from Agricultural Officer, Newton. 1,308 birds of all ages were sold; 23,797 eggs were laid during the year of which 18,802 were sold for table use.

111. Turkeys were received from Newton late in 1960 and 305 were hatched at Musaia during the year, but 153 died. The flock at the end of the year was 144 birds.

112. *Maintenance.* The fencing programme was completed during the year and 6 cattle grids were constructed.

113. *Pastures.* One hundred and seventy acres were cleared and planted with improved grasses during the year. Seventy-six acres of Para grass (*Brachvaria mutica*) were planted on the low lying land at Khiffa and Madogbo herd areas. Eighty two acres of Pangola grass (*Digitaria decubens*) and 10 acres Molasses grass (*Melinia minutiflora*) were planted adjacent to the Musaia road, Quarter-acre plots of *Sectaria kasumgula* and *Chloria gayana* were established.

C—Horticultural Section

114. As in previous years the policy of this Section was based upon the stimulation of production of horticultural food crops in all parts of the country, the improvement of quality and quantity, and a continuation and expansion of the onion scheme which was introduced in 1960. Growers in most parts of the country were assisted by the extension staff of the section, and there is now an extension officer in each Province, and at Moyamba and Mahera, the two main centres of the onion scheme.

115. The supply of planting materials, with emphasis on the distribution of economic plants, continued to be a major activity of the Section, but commercial firms were encouraged to retail equipment, seeds, chemicals and fertilisers. Large quantities of seeds and fertilisers were sold to the general public.

116. Experiments on improved techniques of vegetable production, methods of improving quality, and testing new introductions in variety trials, continued. Recommendations, based on the results obtained, were passed on to growers by the extension staff. Soil conservation methods were advocated, and demonstrations given to growers whenever possible.

117. During the latter part of the year it was possible to start a weekly lecture course for Nursery Attendants. There continued to be a number of requests from Government Departments, commercial firms, and private individuals for trained staff, and assistance was given by recommending suitably trained personnel to them.

118. *New England Experimental Horticultural Station.* The headquarters of the Section continued to serve as a Plant Introduction Experimental Station, and nursery for economic and ornamental plants. Terracing against soil erosion continued, and the drainage system and service roads were improved.

119. New propagating bins were constructed in the plant house and a 'Constant mist' unit installed. This equipment should result in a considerable increase in the volume of planting material which can be propagated by cuttings.

120. It was impossible to carry out a planned experimental programme, due to the fact that a large area of the experimental plots was used for the production of plants for Independence Decorations in the early part of the year, and the Royal Visit Decorations during the latter part of the year.

121. The station and extension staff were fully committed to preparations for these two events during the greater part of the year, since many of the plants required for the various occasions had to be propagated several months in advance.

122. The use of 500 gauge polythene sheeting, for the protection of young vegetable seedlings during the heavy rains, continued to give satisfactory and commercial applicable results. A mobile plant house, constructed of slotted aluminium and polythene, also demonstrated the use of this material for safeguarding young plants from mechanical damage during heavy rain.

123. A small shelter of the same type was in use at Lumley, for the shading of plants during budding operations in the dry season. It can also be used for the protection of the operator and plants in the wet season.

124. Demonstrations and lectures were given by members of the staff to schools and organisations, mainly on methods of vegetable growing.

125. *Lumley Horticultural Station.* The propagation of economic plants, mainly mangoes and citrus, continued to be the main function of this station, although, due to the shortage of suitable land at New England, the production of vegetable seeds was transferred to this station.

126. Additional terraces were constructed and planted with several thousand seedlings for subsequent budding. Cover crops were sown, as an anti-erosion measure, between the trees in the permanent blocks. These were maintained in good condition by routine cultivation operations and fertiliser applications during the wet season.

127. Machinery was extensively used on the station, particularly for irrigation of young stock during the dry season. The additional land which became available for extending the station was surrounded with a permanent wire fence during the second half of the year, considerably improving the security of the station.

128. Part of the irrigation system was re-designed in order to increase the coverage of the system and increase efficiency. Terraces were reconstructed where necessary; some of these with permanent concrete retaining walls. New drains were dug where required.

129. The dwarf 'Fiji' coconut variety continued to fruit well and seeds were sown for the first time. The plants of the recently introduced "Aceituno" (*Sim arouba glauca*) grew satisfactorily. They were observed to retain their leaves during the dry season and had reached a height of 5′ by the end of the year. Records of fruits yielded by individual citrus trees were made, for selection of high yielding varieties and clones.

130. *Kabala Horticultural Station.* Production of economic plants, vegetable variety and fertiliser trials and extension work in the Northern Province, continued to be the essential functions of this station. Seeds of vegetables such as okra, egg-plant, sweet corn, pepper, beans and various cover crops were produced for distribution to other horticultural stations and resale to local market gardeners.

131. Records of the yields and general performance of both established and new varieties of vegetables were kept, and their potential use as commercial crops evaluated.

132. A 'Wilt resistant' tomato variety from Hawaii gave good results.

133. In the fruit section, the propagation of budded citrus remained the most important operation, and two large terraces were replanted with sour orange seedlings for budding in 1962.

134. The contour terracing continued, and several new varieties of economic trees were established in the permanent blocks. These were safeguarded against erosion by the extensive sowing of cover crops, mainly *Mucuna*, although *Pueraria* was also used.

135. The extensive use of machinery reduced expenditure on routine operations, particularly irrigation during the dry season. A new irrigation pump was allocated to the station, also a small hand truck for transporting planting materials, compost and fertilisers. Two concrete tables were built for the accommodation of fruit trees in plastic pots

136. *Bo Horticultural Station.* Many of the station operations were concerned wih preparations for Independence Celebrations and the Royal Visit, and the staff were occupied with preparing and growing plants for these occasions. Advice and technical assistance was given to the Bo Town Council and an appreciable amount of supervision was also required with the planting and layout of various buildings and amenities.

137. The routine station work continued, although on a reduced scale, and 3,000 sour orange seedlings were established on contour terraces in the nursery section. Permanent trees for the supply of propagating material were also planted. The pineapple block was extended by the planting of 2,000 more suckers.

138. Several vegetable varieties were grown and records kept of their performance; the seeds of some of these were produced for resale.

139. *Njala Nursery.* This station continued to produce economic plants, mainly budded citrus and mangoes. The terraced bunds were repaired and re-planted to prevent erosion, and shade trees established along the edge of the terraces. A new concrete plant table was built, and the office/store building completed.

140. Due to a breakdown in the irrigation system, the quantity of budded trees produced was appreciably less than had been anticipated.

141. *Extension work.* During the year it was possible to re-organise some of the duties of the station staff so that each station would have a graded Instructor in charge of routine operations and an additional Instructor attached to the station as an Extension Officer.

142. The duties of the Extension Officer were to relay to the growers in his District the information gained from the station trials and experiments, and to liaise with the station Instructor on the quantity of planting materials and seeds required for the area during the course of the year. The following summary gives details of the main extension operations and activities undertaken during the year by Extension Instructors based at the various Horticultural Stations.

143. The Terracing Scheme supervised from New England continued in the Mountain Districts and about 12 applicants were assisted. The schools at Gloucester and Regent were also given help with their soil conservation problems.

144. Many Government Departments and some commercial firms were advised on the layout and planting of office surrounds; also on the renovation of previously planted areas. The Independence Avenue and Cotton Tree areas were extensively planted and subsequently maintained.

145. Market gardeners in the Mountain Districts and Eastern Villages were assisted with technical problems, particularly those connected with pest and disease conrol, fertiliser use and irrigation.

146. *Bo and Kenema.* The Bo and Kenema Districts were supervised by one Extension Officer, based at Bo, with additional staff at both Bo and Kenema. The reports received from Bo indicated that the supply of vegetables in this area was better than it had been for some years, and that appreciable quantities were in fact being exported to surrounding towns and villages. Many requests for advice and assistance were, however, received from commercial and private growers in the Districts.

147. Two groups of commercial growers formed themselves into a Selling Association, and this experiment appeared to be very successful. The planting of economic trees was advocated, and became one of the main objectives of the extension programme.

148. The interest in the Kenema District appeared to be increasing, and the Extension staff were fully occupied in assisting private and commercial growers of fruit and vegetable crops with their problems. It was possible to interest one local firm in selling vegetable seeds, in order to improve the supply of seeds in this area.

149. The demand for economic trees in the Kenema area continued to increase, and it appears that a production nursery in the area is now necessary.

150. The Extension work in the Kabala area was limited, owing to a temporary shortage of staff, but contact with the local private and commercial growers of horticultural crops was maintained, although many of them live in relatively remote areas. Attention was concentrated on those crops which are either used locally for food, or which can be transported over fairly long distances without damage. Onion growing was one of the main features of the extension programme.

Onion Scheme:

151. *Mahera—Kaffu-Bullom Chiefdom.* This scheme was initiated in 1960, and resulted in the production of about ½ ton of onions. The reception given by the participants in the scheme was, naturally, a cautious one, in the first year, since this crop is an entirely new one in the area. During the current year, however, the interest increased considerably, and the number of active growers rose from 41 to 59.

152. It became possible to post an extra Instructor to the area as from December, to supervise the scheme which had been the sole responsibility of a Junior Agricultural Instructor in the previous year.

153. Seeds and fertilisers were made available, as from October, and a small seedling nursery was established to provide young plants for growers who could not raise their own seedlings.

154. Direct and frequent contact with the growers was maintained by regular visits, and confidence was established by the extension officers working with the growers and showing them the various stages of cultivation by rendering practical assistance with these operations.

155. It is estimated that the yield of the dry season period 1961–62 will be in the region of 5 tons.

156. *Moyamba District.* An Instructor and Junior Instructor were posted to Moyamba as from October to initiate the scheme. Once the original difficulties which are normally encountered with the introduction of a new scheme had been overcome, the response was found to be very satisfactory.

157. The actual number of active growers was about 70, but they were widely dispersed over the District, and transport was found to be essential for the adequate supervision of the scheme. Eight chiefdoms in the area were visited by the Extension Staff, and one or two 'co-operative' villages were found to be enthusiastic supporters of the scheme.

158. It is estimated that the production from the District will be in the region of 4–5 tons.

159. *Distribution of Planting Materials.* The annual planting material distribution figures for the last ten years are as follows:—

Year	*Economic Plants*	*Shade Trees and Miscellaneous Plants*
1952	796	460
1953	1,599	870
1954	3,898	1,970
1955	4,244	6,760
1956	3,547	6,916
1957	4,585	7,502
1958	3,367	6,504
1959	8,651	6,682
1960	9,852	11,716
1961	12,514	22,044

160. The number of seedlings and cuttings distributed was *10.024. 19,356* packets of seeds were issued or sold.

161. *Plant Introduction.* The total number of 'introductions' recorded for the year was 71, of which 52 were successfully established.

162. *Technical Publications.* The following Horticultural Notes were issued:—

No. 22. New method of propagation and multiplication of banana plants
23. Wind breaks, screen and hedges
24. Cover crops
25. Shade trees
26. Mangoes
27. Citrus—varieties in cultivation in Sierra Leone
28. The establishment of a grass cover
29. Pineapples
30. Plastic aids to horticulture.

163. *Horticultural Show.* A successful Horticultural Show was held on 30th March, 1961, this being the Tenth Annual Show since 1951. It was held at the Freetown Secondary School for Girls, Brookfields, and was supported by over 900 exhibits from the Freetown and Rural Area. Many prominent citizens attended the Show, which was opened by the Honourable Minister of Natural Resources.

D—Water Development Section

164. *Yakban Drainage Project.* Work on this project continued satisfactorily with the reclamation of a further 1,100 acres bringing the total area to 2,400 acres. Considerable difficulty is still being experienced in allocating the new land to farmers. In the Funkedeh area, completed in 1959 only about half the total area has been allocated so far and in the Yakban area only the Makot branch of the swamp has been allocated. This is not due to lack of interest by local farmers but is due apparently to the reluctance of the local authorities to allocate it. Of the 500 acres of land allocated in the Makot branch of the Yakban Swamp about 75 per cent was planted during the rains. It is hoped that the Yakban project will be completed by the end of 1962.

165. *Rhombe Swamp Survey.* The survey of this swamp, commenced under contract by Messrs. Story and Partners of London in November, 1960, was completed in March, 1961. Of the total 22,000 acres, 16,000 acres have been contour mapped at one foot intervals which will enable a drainage system to be designed. The six automatic river gauges, set up in 1960, are still being read to give accurate data on flood levels.

166. *Investigation.* Investigation work during the year was confined to the taking of salinity samples in the Little Scarcies, Ribbi and Bumpe Rivers to determine at what distance from the mouth salt might interfere with rice cultivation.

167. *Dredger.* One small suction dredger was ordered and received during the year but has not yet been assembled. When put into commission it will be used for the maintenance of existing drainage channels and can also be used for the reclamation of small low lying areas, and for the dredging of sand banks.

E—Produce Inspection Branch

168. *General Activities.* During the past year the branch was mainly concerned with the examination of palm kernels, piassava, coffee, cocoa and benniseed. A few tests were carried out by request on palm oil and groundnut samples.

169. A series of tests of rice coming into the mills at Torma, Mambolo, and Kissy Dockyard was carried out. It was found that more than half the parcels examined could not have been accepted under the new rules because of an excessively high moisture content. The standards were amended however to allow a slightly higher moisture content.

170. *Palm Kernels.* Quality was satisfactory in 1961. There has been an increase in dust and shell content recently; before and after bagging inspection was ordered to rectify this.

171. *Coffee.* The season was good and there was an improvement in quality with fewer black beans in consignments examined.

172. *Cocoa.* The 1961/62 cocoa season was late and only a few consignments were inspected in 1961. The yield was however a record for the season being over 3,800 tons. Quality was good with a marked decrease in mould content percentages.

173. *Benniseed.* The export of benniseed increased by 300 tons the greater part of which came from the Republic of Guinea.

F—Extension Work

South-western Circle (Pujehun–Bo)

174. *Extension Work.* A more thorough coverage of the Circle was possible in the latter half of the year with the release of two Agricultural Instructors from the plantation and the posting of two Agricultural Instructors to the Circle.

175. Nineteen Farm Instructors who attended a short training course at Njala Training College were appointed to work in the Chiefdoms. They are Native Administration employees but work under the supervision of staff of this Department as do 13 District Council Demonstrators (8 in Bo District and 5 in Pujehun District).

176. *Nurseries.* There are eight nurseries in the Circle; in Pujehun District two are financed by Produce Marketing Board grants and in Bo District all are financed from the Council's own funds. Supervision is given to these nurseries and each Instructor has a nursery to supervise and an area for extension work. A ' clip card ' system for all trees crop distributions has been introduced and will allow survival rates to be assessed.

177. *Cocoa.* Keen interest was shown by farmers in the Amazon variety of cocoa and 8,562 seedlings were sold in Bo and Pujehun Districts. A further 6,290 Amelonado seedlings were supplied in Bo District. The production of Amelonado cocoa seedlings has been discontinued in Pujehun nurseries but will continue in the Bo district nurseries until sufficient Amazon seedlings are available.

178. An investigation was carried out into the survival of Amazon cocoa on farm after distribution. Of the 132 farms receiving seedlings, 54 were visited 4 to 6 months after planting. The following table shows the numbers of farms grouped according to the percentage of dead seedlings found.

179.

	% Failures			
	0–4%;	5–9%;	10–14%;	15% and over
No. of farms	39	7	6	2

It is thought that those farms receiving small numbers of plants have higher death rate due to the increased transport time when a large number of small consignments is carried in an open lorry.

180. *Monkey Drives.* Monkey drives were conducted in the cocoa growing areas in August and September. 18,927 monkeys were killed in Pujehun District and 4,850 in Bo District.

181. *Amazon Cocoa Plantation—Futa.* 951 pods were harvested from the Futa plantation and used for seed in the nurseries; 791 at Pujehun, 60 at Zimmi and 100 at Jimmie.

Summary of Futa Harvest:—

	Variety	*No. of Pods*
T 60	1775 x 1051	327
T 12	27 x 26	318
T 85	799 x 876	243
		951

182. One tree died during the year—the cause of death was not discovered. The plantation was sprayed with Aldrin as a precautionary measure against capsid although no capsid has been recorded. Caterpillars destroyed a number of pods.

183. *Coffee.* Extension work in relation to this crop has been directed towards improved cultural practices but many farmers continued to extend their plantations. The number of seedlings distributed is given below:—

	1959	*1960*	*1961*	*Stock in hand*
Pujehun	1,865	—	2,665	14,796
Bo	20,142	24,889	30,271	42,856

184. Stem borer is the worst pest of coffee in the circle and the Entomologist is conducting a trial at Niagolehun to determine the best control measures.

185. *Oil Palms.* The demand for oil palms continued. 10,379 E.W. Seed ex—W.A.I.F.O.R. were received during the year. The following numbers of seedlings were distributed:—

	1959	*1960*	*1961*
Pujehun	1,910	5,575	3,365
Bo	10,692	2,118	11,601
Moyamba	10,360	777	16,584

186. *Bo District Council Plantation—Gbaama.* During the year, 60 acres were cleared, 35 acres were planted and a further 25 acres will be planted in 1962. The good condition of the previously planted areas was maintained. The Council hopes to obtain a Stork hydraulic press for oil extraction.

187. *Rubber.* The plantation at Gofor was maintained during the year and the cover crop has grown well. 38 seedlings to replace those destroyed by goats, will be obtained from Njala. 500 plants were distributed from the nursery at Twasu.

188. *Seed Rice Farm, Mandu.* 1 acre each of Radin China 4 and Faya were sown; the Faya yielded 16 bushels and Radin China 23 bushels. Of this total 29 bushels were sold to farmers for seed. With the increased number of field staff and an intensification of the Multiplication Scheme it is hoped to make a considerable amount of progress in the coming year.

189. *Bo Poultry Scheme.* The buildings for the above scheme were completed during the year. On the 13th October, 962 point of lay pullets were received from Newton and these came into lay on the 14th December. The eggs are sold in Bo ungraded at 5/- per dozen. Grading will be introduced next year. By the 31st January, 129 birds had died. The two main causes of death were cannibalism and fowl paralysis.

North-western Circle (Port Loko-Scarcies)

190. *Extension Work.* In addition to the normal general duties staff were engaged on mechanical cultivation and threshing of rice, extension of the seed rice scheme and mangrove clearance schemes. Materials, poultry and fertilizers were also distributed throughout the Circle. A considerable amount of plantng materal was also produced for the Royal Visit.

191. *Mechanical Cultivation.* The area was further increased by the opening of new sites in north Kambia District at Tonko Limba. These did not, however, prove a success due to flooding and bad husbandry and it is now obvious that the difficulty of operating at such extreme range is not worth while. Ploughing at Gbomsamba in Buya Romendi was again carried out with success, but even here the distance from base is too great for really efficient operation. Acreages at both these distant sites did not meet farmers demands due to breakdowns and subsequent long delays.

Once again the response from farmers along the Little Scarcies was poor and acreages were disappointing. Acreages throughout the Circle were as follows:—

Site	*Ploughed*	*Harrowed*	*Allocated*	*Seed Harrowed*
Gbomsamba	290	290	290	40
Tonko Limba				
(1) Kindi	125	125	125	
(2) Kontamara ...	108	108	72	87
(3) Samaia	84	84	84	
Little Scarcies				
(1) Kamala	45.5	45.5	45.5	
(2) Kantabana ...	14.3	14.3	14.3	
(3) Konta	6.5	6.5	6.5	6
(4) Katonga/Katoma	4.5	4.5	4.5	
(5) Katonga/Syrien ...	12	12	12	
	690	690	654	133

193. Annual acreage figures are as follows:—

	1952	*1953*	*1954*	*1955*	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*
Ploughed	453	441	757	1,000	2,008	2,334	320	243	592	690
Harrowed ...	448	441	735	1,000	2,008	2,334	293	?	511	690

Mechanical threshing was disappointing compared to the previous season and only 296 bushels were dealt with as compared with 5,654 bushels last year.

194. *Seed Rice Scheme.* A total 191.5 bushels of seed rice mostly Radin China 4 was produced by Departmental seed farms and this was distributed to Master Farmers in the following places—

Kychom (Samu)	Radin China 4	36 bushels
Mapotolon (Samu)	„	6 „
Port Loko (Maforki) ...	„	15 „
Mange (Bure)	„	6 „
Maboni (Maforki)	„	6 „
Kambia (Magbema)	„	15 „
Mambolo (Magbema) ...	„	8 „
Makot (Magbema)	„	20 „
Katik (Lokosama) ...	„	1 „
„ „	Lead	1 „
		114 bushels

195. Departmental seed farms were prepared at Makot and Rokupr, consisting of 6 acres in all. 3 separate acre plots at Makot were not a success. Germination was poor and it is suspected that improperly dried seed was the main cause of the failure.

196. *Oil Palms.* There has been an all-round improvement in nursery practice which has been greatly assisted by the short course at W.A.I.F.O.R. (Njala) attended by District Council Nursery staff.

Distribution from nurseries was as follows:—

Port Loko	
Mahera	9,686
Port Loko	5,000
Rosint	1,912
Kambia	
Kamaranka	5,525
	22,123

197. At the end of the year there were approximately 32,000 plants in stock at all nurseries. Maintenance was carried out on the plantations at Malal, Katonga and Konta and fire breaks were made.

198. *Other Planting Material.* In addition to oil palms, 4,957 coffee plants and 119 coconuts were distributed from nurseries. 330 seedlings were also distributed from the Horticulturist. 8,500 coconuts were also nursed, but demand for these is not as great as expected and arrangements are being made for distribution outside the Circle.

199. *Livestock.* 310 pairs of Rhode Island Red chickens were received from Newton and distributed to farmers throughout the Circle.

200. *Mangrove Clearance.* As usual Yaliba was not utilised due to salinity, but Rowal farmers took up 34½ acres. The voluntary clearance and planting scheme at Gbabai continued and it is hoped that a survey of the extent of this work can be carried out in the new year. It is possible, too, that assistance can be given to them by the use of arboricides.

201. *Irrigation and Drainage.* Satisfactory yields were obtained at Luti, Rosino and Bakepet. At Funkedeh, salinity gave some trouble on a few acres, but this condition improved for the second crop. An Agricultural Instructor was posted to Makot to supervise allocations and bund construction round individual plots. At the same time he has encouraged the planting of bananas round the verges of the swamp and got the people to make access roads.

South-eastern Circle (Kenema–Kailahun–Kono)

202. *General.* Staff continued to be assigned, as in previous years to the three District Councils for extension work duties. Junior Staff were also engaged on the Kono Development Plan, to the Cocoa and Coffee Development station at Kpuwabu and to the newly opened experimental station at Pendembu. In addition two members of the Junior Staff were assisting at the newly established Kenema Rural Institute and with the F.A.O. Soil Survey Team which commenced operations at Kenema. The Black Pod spraying campaign also went on apace.

203. *Rice.* Most of the rice grown in the circle is done on the uplands, and much effort and propaganda was directed towards convincing them that the use of inland swamps would be more economical and productive. Many farmers accepted the advice given and it is hoped that the number using inland swamp will increase considerably in the season that lies ahead.

204. Sales of seed rice grown on the District Council Swamps was good. 147 bushels of Radin China and 48 bushels of Faya were sold. 64 bushels of the Radin China and 14 bushels of the Faya were sold to farmers for multiplication purposes. Sales of Superphosphate were low.

205. *Oil Palms.* Distribution was as follows:—

1961 Distribution

		Seedlings in nursery for 1962 distribution
Kenema	—	3,966
Buedu	1,128	528
Segbwema	80	860
Manowa	662	400

206. In December 20,000 germinated E.W. seeds were received from Njala. They were pre-nursed on raised trays and will be transferred to nursery beds in 1962.

207. *Coffee.* Many of the coffee plantations were falling into a poor state. Consequently operations were directed towards improving and consolidating existing plantations rather than establishing new ones. This policy paid dividends and by the end of the year coffee plantations looked more healthy and prosperous.

208. Yields were however low especially in the Kenema district. There were some very high winds just at the time the berries were setting and many of the blossoms were blown off the trees. The coffee experiments continued at Kpuwabu and Pendembu and are given in detail in the appendices at the end of this report.

209. *Cocoa.* Interest in this crop was maintained during the year, and all the Amazon seedlings were distributed to those farmers recommended by the Co-operative Department, Kenema. The land of these farmers was inspected prior to seedlings being supplied to ensure that none of them would be wasted. By the end of the planting season 9,510 seedlings had been distributed at a charge of 1*s.* per seedling. Survival rates were in the region of 90 per cent at the end of a six month period. Most of the deaths were caused through attacks of Xyleborus sp. of Stem borer. Yields for the 1961/62 season are recorded below. There was a much higher yield from the improved crop.

Buying Centre	*September, 1960/ May, 1961*	*September, 1961/ May, 1962*
Blama	3,114	3,474
Kenema	10,122	10,617
Hangha	5,535	5,108
Segbwema	11,966	9,253
Daru	5,206	8,004
Baiima	4,580	10,252
Pendembu	8,430	4,285
Kailahun	5,750	6,402
Gandorhun	—	2,382
Total (in bags) ...	54,701	60,769

Over 99% of the cocoa purchased was Grade I.

210. *Amazon Cocoa Nurseries.* A supply of Amazon F2 pods were obtained from the West African Cocoa Research Institute and nurseries were established at Kpuwabu, Kenema, Segbwema, Manowa, Kailahun and Kono (2).

211. Each nursery was established near a good supply of water and equipped with a 200 gallon tank fitted with a hand rotary pump.

212. A total of 30,890 seeds was planted at a cost of £743 18*s.* 1*d.* A total of 9,510 seedlings was sold for £943 7*s.* 0*d.* The balance of seedlings was retained for distrbution in 1962.

213. The Plant Pathologist's staff carried out a trial to compare Carbide Bordeaux with Peronox and to compare times of application at three, four and six week intervals. Details of the results will be published in the 1962 Annual Report.

214. *Capsids.* The Entomologist continued his experiment on the control of Capsids and mention is made of the results under the appropriate section.

215. *Monkey Drives.* A series of Monkey Drives was held throughout the Province. 13,240 of the pests were destroyed. In addition large numbers of live monkeys were purchased by private individuals for supply to Zoos and other Institutes for research purposes.

216. *Cocoa and Coffee Development Stations—Kpuwabu, Pendembu and Kenema.* Until this year there had been no satisfactory system for the collection and storage of experimental records that are being obtained from the experimental work now in progress at the above stations. In May, 1961 it was decided that no further trials be put down until a system had been devised for collecting and storing results.

217. The following system was designed and is now in use. All experiments are entered in an Experimental Log Book, the design of which is almost an exact copy of those used in Nigeria. The Log Books for the whole circle are held in Kenema office.

218. All field trials are numbered as in the past using the block numbers in which the trials are planted.

219. Nursery trials are given the following numbering system:

EXP. NO. KP (Kpuwabu) or Pe. (Pendembu)
N (Nursery) followed by an index number.

Detailed reports on the various experiments are set out in the appendices.

220. *Cocoa Virus Survey.* The modified Cocoa Virus Survey continued uninterupted throughout the year and 87,966 acres were surveyed. Although this acreage may appear small compared with the total acreage of the cocoa producing area it must be remembered that the survey is working in the most heavily planted section of the country.

221. The 87,966 acres of country surveyed contained 4,852 acres of cocoa and 10,023 acres of coffee.

222. The number of small outbreaks were widely scattered and no large concentrated outbreak was discovered.

223. The progress made by the end of the year is recorded thus:—

Period	*Total Area Surveyed*	*Cocoa Acres*	*Coffee Acres*
1960–61	111,847	5,654	12,178

As a result of the survey the following suspected virus outbreaks were discovered—

Gandorhun ... ... 4 Giehun 21

Southern Circle (Bonthe)

224. *Mangrove Swamps.* The acreage of cleared mangrove land allocated was rather disappointing. Of the 158 acres allocated in 1960 only 11 acres were taken up again by farmers in the Pooth Booth area during the year. This large fall in acreage can be attributed partly to late allocation (which did not take place until July) and partly due to disappointment with the 1960 crop which had suffered severe flood and monkey damage particularly in the Mandu and Shenge Island areas. It is hoped to do allocation early in the year in future. Yields in other mangrove areas were on the whole good.

225. *Rice Experiments.* (*a*) Variety Trials. The West African Rice Research Station laid down two variety trials, one of floating rices on Torma II and the other on the shallow flooding areas on Mayeke site. The former trial consisted of seven varieties comprising two selections of white grain Mbagboli, Radin China 4, Anak Didek, Gatong, Seri Raja and Parn A 191 in a randomised block design with six replications. The Mbagboli selections were attached by *Piricularia sp.* early in July; effect of drought was very evident in June and early July but normal growth followed when

the plots were flooded late in July. Flooding was shallow and there was no flood damage. Anak Didek gave the highest yield and Gatong the lowest yield. The Mbagboli selections were out yielded by all varieties with the exception of Gatong. This confirms that the shallow flooding type is not ideal for Mbagboli.

226. (*b*) Herbicide trial—A trial was laid down on Makita site with the assistance of the West African Rice Research Station to assess the effectiveness of herbicide FW 734 for weed control in rice.

227. The following treatments based on the manufacturer's recommendation were applied:

A. Control no weeding.
B. Two hand weedings at usual times.
C. 3 lb. FW—734/acre at 2 leaf stage.
D. 5 lb. FW—734/acre at 3–4 leaf stage.
E. 3 lb. FW—734/acre at 3–4 leaf stage
F. 5 lb. FW—734/acre at 2 leaf stage.
FW 734 dosage 5 lb/acre—110cc/1/100 acre.
3 lb/acre—70cc/1/100 acre.

228. The design was a randomised block, with 5 replications; plot size 15′ x 30′ (approximately $\frac{1}{100}$ acre). The herbicide which is an Emulsifiable concentrate was dissolved in a suitable volume of water to give a reasonable spray volume. Radin China 4 was sown on all plots at a rate of 9 ozs. per plot on 7th May. Two weeks after germination the plots were severely attacked by beetles resulting in large bare patches in several plots. No worthwhile results were therefore obtained from the trial but by late July even before the plots were completely flooded the effects of the herbicide were obvious. It is proposed to repeat this trial taking adequate precautions against insect pests.

229. *Piassava Experiments.* The results of the Tropical Products Institute tests on Piassava prepared by various boiling and retting treatments in 1959 indicated that boiling produced fibres just as good as those produced by retting. The results also indicate that fibres prepared from the fronts and sides of fronds produced better quality piassava than those from the backs. Boiling is now being widely adopted by producers as it is obviously quicker. On the basis of the Tropical Products Institute results a simple experiment was laid down with the following treatments:—

1. Boiling for 12 hours no retting
2. Boiling for 24 hours no retting
3. Retting for 3 months (standard method).

230. Treatments 1 and 2 are being tested to see if there is any significant difference in the quality of the products. Only fronts and sides of mature fronds were used in the experiment. Samples have been processed and will be forwarded to the Tropical Products Institute for further testing by manufacturers.

231. *Crop Rotation.* The rotation trial on Makita site was abandoned as insufficient seed of some crops was available to allow adequate replications for a statistically designed experiment. Observation plots were however sown on 10th May, 1961 but these proved a disappointing failure. The pigeon pea failed to germinate. The Cow peas produced an excellent crop after 9 weeks with a yield of 71 lb. from 3,600 sq. ft. or 859 lb. per acre.

At the time the cow peas flowered and pods were set heavy rains were experienced and this may have affected the yield. A dry season crop was therefore sown in December with the object of determining the possibility of using cow peas as a dry season catch crop on the high banks of mechanical cultivation sites which dry out early and also as a double crop in the whole area. The yield from this dry season crop was 65 lb. from 1,800 sq. ft. or 1,578 lb/acre.

232. *Seed Rice Multiplication.* The seed rice multiplication scheme was again conducted through Master Farmers and twenty-eight bushels of Indo China 53 and forty-two bushels of Radin China 4 were sold in the Waanje and Upper Sewa areas respectively. The Indo China 53 claimed to be a floating rice suffered severe flood damage in the Waanje area where generally flooding damage in the Waanje area where generally flooding was up to 12–15 ft. About 13 acres were severely damaged with a total loss of the crop. The crop that survived flooding flowered early (in late October) and matured in standing water. Farmers were unable to scare away birds and this together with the lodging of some of the crop in water caused about a 40 per cent loss of crop. This rice has now been withdrawn from distribution.

233. On a brighter note the Radin China 4 distributed in Upper Sewa area on the higher lands where flooding was up to 2–4 ft. did extremely well and gave very good yields.

234. *Mechanical Cultivation.* The 1960 crop being a good one harvesting continued well into February and ploughing could not start before the third week of that month. Njeilonda and Boyawoma sites in Pujehun District previously worked by South Western Circle were transferred to this Circle. Two new sites were opened at Konigbenga and Mokelle in Yakemo Kpukumu Krim and Mano Sakrim chiefdoms respectively in Pujehun District and Subu site which was closed in 1957 was re-opened.

235. The tractor force consisted of 3 Caterpillar D4 s, 1 Track Marshall, 1 International B.T.D. 6 and 25 Fowler VFA's. In spite of the favourable season and the large tractor force the rate of work was not satisfactory. Only twenty tractors gave satisfactory performance; eight Fowlers became unserviceable early in April and remained so for the rest of the season. Most of the Fowler tractors have done seven season's work and are approaching the end of their useful life. Breakdowns were frequent and by April stocks of some Fowler spares were exhausted.

236. The Landing Craft rendered unsatisfactory service as one engine was unserviceable and the other worked fitfully. Thus the movement of tractors from one site to another was greatly hampered. Tractors had perforce to remain idle on sites where they had completed work.

237. As a direct consequence of these mechanical troubles all operations were completed later than was expected. To alleviate the acute tractor shortage it was necessary to request the use of the Torma Co-operative's Caterpillar tractors to undertake the greater part of seed harrowing on Mayeke site thus freeing some machines for work on other sites.

238. Demand for ploughed land was again high and it was impossible to satisfy it. 6,934 acres were allocated to farmers on 22 sites extending from Taigbe in Bendu Cha Chiefdom to Gbehan in Bum Chiefdom on the Waanje river in Pujehun District. This acreage is an increase of 25 per cent on the 1960 acreage.

239. There was again a big demand for seed harrowing. Unfortunately due to the tractor situation this service was not made available to all farmers requiring it. The prospect of sowing with the native hoe is unpalatable to many farmers and some wish to reduce their acreage if seed harrowing cannot be done for them.

240. The Co-operative Department ploughed and allocated 738 acres for members of Torma and Yawbeko societies in the Torma area and also seed harrowed 650 acres for this department on Mayeke site.

241. Although sowing was completed late, only minor flood damage occurred on Batahol I and Katin sites. Growth generally was good and another bumper harvest is expected. Yields recorded on a few sites are shown below:—

Site	*Yield/acre Bushels*
Boyawoma	40
Diamani	37½
Mayeke	29
Kpatobu	29
Gandema	30

242. *Banana Project.* The two banana nurseries established at Torma by the Sierra Leone Agricultural Corporation were taken over by the Agricultural Division on 1st March, 1961. The East bank nursery was heavily attacked by Cercospora leaf spot disease; spraying with Perenox proved ineffective and the nursery was closed in November. The West bank nursery was maintained and plants in both the main Poyo and Gros Michel nurseries and pilot plots came into bearing. 30 bunches weighing 582 lbs. were harvested. Bunches from Poyo plots averaged six hands and generally gave small weights. The fruits were obtained from plants in the nursery which are closely planted for sucker propagation and were not therefore of export quality.

243. *Extension Service.* Extension work was carried out through the Agricultural Instructor assigned to the Bonthe District Council who was engaged in assisting with Council's Agricultural Scheme and supervising Native Administration Farm Instructors recruited early in the year in connection with the Economic Tree Planting Scheme. The Gambia Oil Palm Plantation run by the District Council was maintained. The income accruing from fruit harvested from this 20 acre block was disappointing. Total revenue was only £29 12*s.* 0*d.* for 9,660 lb. of fruits. For the age of the plantation this production is very poor. The contributing factors may be unchecked animal depredation, theft of fruits and poor maintenance in past years due to lack of funds. The Oil Palm Nursery at Gambia was maintained up to July when it was closed and replaced by a new nursery at Bauya. About 10,000 germinated E.W. seeds were sown in this new nursery in December.

244. Three thousand, six hundred improved oil palm seedling were distributed to farmers in Bonthe and Jong, Kpandakemo, Sogbini and Yawbeko Chiefdoms. Of these 2,000 seedlings were provided by the Produce Marketing Board from their Kasse Plantation nursery while 1,000 were obtained from the Gambia nursery and 600 from Njala. The establishment of these seedlings was satisfactory and this was due to the attention given to individual farmers by both the District Council and Native Administration Agricultural Staff. The acreage of mangrove swamp allocated fell from 150 in 1960 to 11 in 1961.

245. The severe flood and monkey damage in 1960 which resulted in a loss of from 50 to 90 per cent of the crop was no doubt the principal factor which discouraged farmers from taking plots. Also, due to staff shortage the Agricultural Instructor assigned to the Bonthe District Council was deassigned and posted to mechanical cultivation duties from February to May and consequently allocation was delayed until July.

Northern Circle (Bombali–Tonkolili)

246. *General.* Advisory services to farmres and provision of improved planting material were continued. The Department continued to supervise the agricultural activities of Bombali and Tonkolili District Councils. In response to local demand mechanical cultivation in the Bombali–Sebora and Makari–Gbanti Chiefdoms was increased.

247. *Mechanical Cultivation.* Interest in mechanical cultivation and the demand for ploughing continued to increase particularly in the Makari-Gbanti and Bombali-Sebora chiefdoms. A total of 1,494 acres was ploughed for Co-operative Societies in these areas. This compares with 356 acres in 1959 and 926 in 1960.

248. Since most of the ploughing is now done in the neighbourhood of Makeni the workshop was removed from Batkanu to Makeni.

249. A welcome development associated with the mechanical cultivation of bolis is the interest shown by farmers in the use of fertilizer. There was a record sale of 2,633 cwts. in 1961 compared to 1,410 cwts. in 1960. The use of fertilizer was rewarded by a bumper crop on the Bolis. To help deal with the heavier crop, a 780 M.H. Combine was used as a stationary thresher on one of the ploughing sites and this proved very popular with farmers.

250. *Ox-Ploughing.* Two oxen and a plough were used for demonstration purposes in the Kamakwie area. Farmers were encouraged to bring their oxen for training. Interest at first was not very enthusiastic, owing possibly to the cost to an individual farmer of the oxen and a plough. Groups of farmers were organized to share the cost of one outfit and five such groups were formed.

251. *Prison Farm, Magburaka.* In conjunction with Prisons Department and Production Engineering it was decided to lay out a 550 acre farm on the contour, at the above prison. Alternate strips of oil palm and arable/fallow with swamp rice and blocks of various fruits were envisaged. Work was started during the year and 20 acres of swamp rice, 110 fruit trees including grape fruit, oranges, tangerines, and mangoes, and 2 acres of groundnuts (Sotina) were planted. A vegetable garden was also established.

252. *District Council Poultry Scheme.* A house to hold 1,000 birds on deep litter was constructed on the Bombali District Council farm at Makeni. Point of lay pullets were received from Newton at the end of the year.

253. *Economic Tree Scheme.* Under plans to increase economic tree crops eleven Native Administration farm demonstrators, six from Bombali District and five from Tonkolili District were sent to Njala Training College. On completion of their training they established nurseries in various chiefdom centres and also carried out extension work at village level.

254. *Rice Investigations—Kontobe.* The experimental work at Kontobe was continued and the following experiments were carried out:—

(*a*) *Variety Trials 1, 2 and 3.* These trials were designed by the Botanist, Rice Research Station Rokupr and were essentially a repetition of the 1960 variety trials. Six varieties were tested in 6 x 6 Latin Square. Trial 2 outside the area and Trial 3 in deeper flooding area. Results are summarised in the table below:—

Trial 1—Within Water Control Area *Variety*	*lb/arce*
Haji Haroun	1,271
Nachin 11	1,144
Torma 112	1,003
Radin Siak 34	999
Sokotera	990
Pan A—191	640
Critical difference 5% ...	305
Co-efficient of variation	25%

Trial 2—Outside Water Control Area *Variety*	*lb/acre*
Nachin 11	1,149
Torma 112	785
Pan A—191	735
Haji Haroun	540
Sokotera	426
Radin Siak	34,445
Critical difference 5%	317
1%	432
Co-efficient of variation	38%

255.

Trial 3—Deeper Flooding Acre

Variety	*lb/acre*
Nachin 11	2,162
Haji Haroun	1,426
Pan A—191	1,289
Torma 112	1,021
Radin Siak 34	640
Sokotera	508
Critical difference 5%	536
1%	731
Co-efficient of variation	38%

256. The yields this season were much the same as the 1960 season. The best variety in all trials for either season was Haji Haroun or Nachin 11 and both are being multiplied at Rokupr.

257. Over the two years the trials within the water control area have yielded less than the trials outside the water control area. This is probably not a real difference but a comment on the worth of the bird-boys. All plots suffered from bird damage. It is hoped to repeat these trials for a third season.

258. (*b*) *Panianala Selections.* Three selections of Panianala which were survivors of large numbers of selections taken from the Bolis round Makeni in 1954, were tested at Kontobe. Plot size was 72′ x 30′ and seed rate was 50 lb/acre. Each plot received 2 cwt/acre of Superphosphate and 1½ cwt./acre of Sulphate of Ammonia.

	lb/acre
Panianala 3rd Selection	1,005
Panianala 2nd Selection	878
Panianala 1st Selection	737

259. Growth was good but yields disappointingly low. Enquiries made at Kontobe suggest that this variety is no longer grown and so local farmers may not be interested in it.

260. (*c*) *W.A.R.R.S. Fertilizer Experiments.* Six fertilizer experiments designed by the Chemist, Rice Research Station, Rokupr were laid out at Kotonbo.

Semi-Boliland Investigations;

261. (*a*) *Farming System trials.* This trial, now in its second year, was devised as an attempt to find a suitable mixed farming system for semibolilands by integrating crops and stock. The rotation selected was as follows:—

2 years grass—grazing and topping
1 year roots and legumes (cattle feed)—pigeon peas and sweet potatoes
1 year mixed cereals—rice, maize and benniseed
1 year legumes—cash crop and cattle feed (groundnuts)
1 year vegetables—peppers and local vegetables.

262. *Plot A.* The grass plot of *Brachiaria mutica* (Para grass) now in its second year was invaded by Lalang grass (*Imperata cylindrica*) making grazing unpalatable to stock. It was topped frequently during the rains to encourage new growth which was grazed in the young stages.

263. *Plot B.* This was a half acre plot of cassava and pigeon peas planted during the early rains in May. Growth was satisfactory but yields moderate—1392 lb/acre cassava and 240 lb/acre pigeon peas.

264. *Plot C.* A half acre crop of mixed cereals—Sorghun and Benniseed failed owing to destruction by rodents. The rice gave a low yield of 317 lb./acre due mainly to rodent and deer destruction.

265. *Plot D.* This half acre of Groundnuts (Gambia) was sub-divided into four $\frac{1}{8}$ acre sub-plots which received the following treatments.

Non-seed-dressed, close spacing (9″ x 9″)
Non-seed-dressed, wide spacing (12″ x 12″)
Seed-dressed close spacing (9″ x 9″)
Seed-dressed wide spacing (12″ x 12″)

Seed was dressed with Fernassan D seed-dressing at rate of $\frac{1}{3}$ oz. per 15 lb. of seed.

Results were as follows:—

Treatment	*lb/acre*
Non-seed-dressed/wide spacing	1,264
Non-seed-dressed/close spacing	832
Seed-dressed/wide spacing	786
Seed-dressed/close spacing	416

266. Results indicate that yield of groundnut in this trial is depressed by close spacing and seed dressing: This result is contrary to expectations and it is proposed to conduct further experiments next season.

267. *Plot E.* This half acre plot of pepper was severely damaged by deer grazing and subsequent growth remained stunted. Yield of pepper/acre harvested was 6 lb.

268. *Summary.* Plots B.C.D. and E were fertilized with 2 cwt. per acre Superphosphate at time of planting. Plot A was top-dressed with 2 cwt. of Superphosphate. Results so far indicate that yields are low and do no more than augment the usual feed for cattle.

269. Yield of groundnuts except for the seed-dressed close spaced treatment was satisfactory and above the average for the district. The trial is only in its second year. It is proposed to continue for at least another season with the modification that a pure stand of rice replaces the mixed cereals.

270. *Jute Trials—Makeni, Kontobe.* The 1960 Jute trials in Makeni and Kontobe were continued. Six varieties of jute—four *C. capsularis* varieties BZ1, BZ2, BZ3, BZ4 and two C. olitorius varieties BZ5, ECR.576—received from the Tropical Products Institute, London were tested both broadcast and drilled in two replications of 6x2 factorial layout. At Makeni the plots were sited at the edge of semiboliland. Both sites were not subject to floodings. Initial growth was good but at a height of approximately 3 feet some plots particularly the *C. capsularis* varieties started wilting. Uprooted wilting plants showed symptoms of a peculiar root node disease. In some plots plants attained a maximum height of 10 ft.

271. Yields of fibre obtained are shown below:—

(i) *Makeni Nursery.*

Yields of Jute in lb./acre.

	Method of Planting		
Variety	*Broadcast*	*Drilled*	*Mean*
BZ 1	438	838	638
BZ 2	573	708	641
BZ 3	436	300	368
BZ 4	302	394	348
BZ 5	148	327	238
ECR. 576	190	312	251
Mean	348	480	414

(ii) *Kontobe—Semi-Boliland*

Yield of Jute in lb/acre.

272.

	Method of Planting		
Variety	*Broadcast*	*Drilled*	*Mean*
BZ 1	354	211	283
BZ 2	708	245	477
BZ 3	354	204	279
BZ 4	320	594	457
BZ 5	191	191	191
ECR. 576	82	164	123
Mean	335	768	302

273. Yields of fibre shown are below those recorded for last season owing presumably to the higher incidence of wilt. It is proposed to continue the investigations further.

274. *Tobacco.* After modifications in nursery and cultural techniques the Aureol Tobacco Company's tobacco trials were more successful than last season's. Greater co-operation was given by farmers and yield and quality of tobacco produced was reported to be satisfactory. It is proposed to continue the trials on an increased scale next season.

275. *Seed Rice Multiplication Scheme.* Ten acres of Nachin 11 were multiplied by " Master Farmers " in the Bolis around Makeni. Four acres were rogued for seed which farmers were encourage to sell at a premium. A one acre plot of Nachin 11 and 1.5 acres of Faya grown in the Nursery at Makeni will be sold for seed to farmers next season.

North-eastern Circle (Koinadugu District)

276. *Cattle Owner Settlement Scheme.* The scheme remained popular during the year and there were requests for extension of the scheme in the Musaia and Mongo Chiefdoms. Farming areas were demarcated in Musaia

Chiefdom which is north of the Mongo River. Preliminary surveys were also carried out on an area between Serekolia and Mongo Bendugu where settlements had been requested. Sulima settlements were re-mapped during the year.

277. Due to unsettled local conditions in Sulima Chiefdom a number of settlements in this chiefdom were vacated in the second half of the year. It is hoped that the settlers will return when a new Paramount Chief has been elected at Falaba.

278.

Chiefdom	*Settlements Surveyed*	*Settlements Registered*	*Settlements occupied Jan.–June*	*Settlements occupied July–Dec.*
Sulima	69	69	53	39
Mongo	39	23	19	20
Musaia	24	24	16	20
	132	116	88	79

279. The growth of the scheme is as follows:—

	1953	*1954*	*1955*	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*
No. registered	17	36	37	44	63	110	110	109	116
No. occupied	14	14	33	29	57	86	89	86	79

280. Lack of marketing facilities continued to hamper the Scheme and it was not possible to rigidly enforce rules regarding overgrazing. The position was further aggravated by most of the settlement areas being placed under quarantine restrictions due to an outbreak of Bovine Pleuro-pneumonia near Kombile during September.

281. Fifteen miles of new roads were constructed by voluntary and paid labour. Some of the older roads were maintained. A new store, workshop, pump-house and fuel store were constructed during the year at Gberia Timbako. The leased area was fenced with concrete posts and 6 strands of barbed wire.

282. The Revolving Fund for the sale of gammatox, coopane, solo sprayers and tools proved popular, and the total sales for the year amounted to £445 15*s.* 9*d.*

283. *Mechanical Cultivation.* Interest in the scheme was maintained and the ploughing of 721 acres and harrowing 206¼ acres was a record for the Circle. The sites were as follows:—

	Acres
Fadugu	73
Kabala	93
Musaia	108 (63¼ acres harrowed)
Manakon	72
Cattle Owner Settlement Scheme Sulima and Mongo	375 (143 acres harrowed)
	721 acres

284. The growth of the scheme in this area is shown below:—

	1952	*1953*	*1954*	*1955*	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*
Acreage Ploughed ...	30	163	127	141	210	140	215	319	594	721

285. *Kabala Sub-station.* The crop of seed rice was not good; the yield being 1,304 lb. per acre although 2 cwts. per acre of superphosphate were applied. The variety multiplied was Faya obtained from Rokupr. E.W. oil palms were distributed to farmers in lots of not less than 60 seedlings. Some sweet orange seedlings were sold. Five ox teams were trained and sold during the year.

Colony Circle (Newton)

286. *Swamp Rice Development.* In spite of the abnormal distribution of rainfall rice yields were satisfactory in most cases. As usual, late plantings did not do so well as those made earlier in the season. Interest in swamp rice cultivation is at a low ebb and only at Fogbo, Saltpond and Makimba was there any increase in the area cultivated by farmers. The crop at Wellington was almost a complete failure as the village Area Committee failed to effect necessary repairs to the bund. Only four acres were cultivated at Campbell Town and one acre at Songo Creek.

287. The area cultivated mechanically was reduced, mainly through the lack of tractors; 37½ acres were ploughed at Robonga and a further 5 at Maswari.

288. Five acres of seed rice were grown by the department, two of Faya and three of Radin China 4. Twenty-two bushels of Radin China 4, eight bushels of Faya and one bushel of D99 were distributed to farmers under the scheme for the multiplication of improved rice varieties.

289. *Oil Palm.* The plantations at Waterloo and Masanki were transferred to the Sierra Leone Produce Marketing Board during the year. Demand for oil palm seedlings was high and although seedlings were only distributed to farmers who had prepared their land adequately these were insufficient to meet the requirements of all farmers. 3,545 seedlings were distributed free of charge during the course of the year. The standard of maintenance of farmers' plantations is, with a few exceptions, low and many farms along the railway were destroyed through the failure of farmers to cut fire breaks.

290. *Fertilisers.* Very few farmers bought fertilisers for application to crops other than rice. Sales were down for the year and only reached 11 tons.

291. *Local Stock Keeping.* The poultry industry developed rapidly during the year and there are now three farmers with over 5,000 birds each and several others owning 500 birds or more. This rapid expansion was able to take place through the purchase of imported stock as it was only towards the end of the year the production of day-old chicks at Newton increased appreciably. In spite of the large number of imported chicks, farmers in the Western Area purchased over 11,000 day-old chicks from Newton.

292. Interest in pig-keeping remained fairly static and there is only one farmer with over 100 head of stock. In general, housing and feeding are not of a high standard and many farmers try to get by on a ration consisting solely of rice bran.

293. *District Council Poultry Scheme.* During the course of the year, stock and feeding stuffs were supplied to the three schemes at Bo, Kenema and Makeni. Until the projects have been in operation for a year at least, it is impossible to give any indication of their economic viability.

G—Agricultural Loans and Credit Fund Scheme

294. As a result of the publication of the Government White Paper on Natural Resources an Agricultural Loan and Credit Fund Scheme was set up during the year.

295. Details of the object of this scheme are outlined in the White Paper mentioned above.

296. Most of the Administrative problems adherent to the implementation of any new scheme had been resolved by the end of the year and the first Board Meeting was held in the Western Area on Monday and Tuesday 2nd and 3rd October. At this meeting eleven applications for credit facilities were considered and of these five applications totalling £4,800 were approved.

H—Agricultural Engineering Section

297. With the secondment of the Agricultural Engineer R. A. Stewart and Agricultural Superintendent (Mechanical) J. J. F. Glass to Road Transport Department the Agricultural Engineering Section was left very short of skilled staff.

298. In spite of this however all tractors less than three years old were given complete overhauls at Kissy Depot. Many of the old Fowler Track-Marshalls and the Massey-Ferguson 35 Diesels also received major repairs.

299. All items of equipment which could not be serviced at out-stations workshops were brought to Kissy Depot during the rains and given complete overhauls in preparation for the next ploughing season.

300. A new engine was fitted to the "George Lines" Landing Craft. The old engine was returned to the makers for reconditioning.

301. The testing of several different makes of tractors which had taken place over the years was completed. It was decided to standardise on International B.T.D. 6 Crawlers for heavy conditions and Internatioal B 450 wheeled tractors for drier conditions during the forthcoming ploughing season. Where special conditions warranted it Caterpillar D 4 would be employed.

I—Research

Plant Pathology Section

302. As no appointment was made to the vacant post of Plant Pathologist only routine work was possible until later in the year when an Experimental Officer arrived from West African Cocoa Research Institute, Ghana. He commenced checking by transmission tests the cocoa virus outbreaks discovered by the Cocoa Virus Survey team. This officer is expected to complete his work early in 1962 when he will return to Ghana.

303. *Collections. Meliola Mangiferae.* The first West African record was confirmed on *Mangifera indica. Mycosphaerella musicola* Leach was collected from the banana nurseries at Torma.

Entomology Section

304. The Entomologist was away on vacation leave from January 2nd to May 20th, during which period the Laboratory Assistant looked after the routine and experimental work of the section.

305. *Cocoa Pests—Capsids.* After two years of extensive trials a stage has been reached where it is possible to recommend a treatment for the control of *Sahlbergella singularia* Hagl, the common cocoa capsid in Sierra Leone. The treatment is as follows:—

> A 0.5 per cent emulsion of gammalin or aldrin, is applied at the rate of five gallons per acre. A double application, with four weeks between each treatment is given before and after the rains, i.e. April—May and October—November. All the cocoa on the farms must be treated. In the dry season a regular inspection of the

farm should be undertaken and any pockets of capsid damage, must be treated at once, the treatment being restricted to the pockets. This pocket spraying must not interfere with the main applications before and after the rains. The first double application which is given must be at twice the recommended concentration, i.e. a 1 per cent solution instead of a 0.5 per cent solution.

306. A scheme for the large scale implementation of the above treatment in Sierra Leone has been devised. The Scheme is based on the use of motorised mist-blowers operating in mobile teams.

307. Trials to compare more accurately the difference between gammalin and aldrin, have been started. Yield records of treated and control plots are being kept at two sites, i.e. at Neikabu (Nongowa Chiefdom) and Megbwema (Gaura Chiefdom). Fifty trees from the centre of each plot are being used for yield recording, and the yields (in total pods) for the 1961 harvest are given below:

	Neikabu	*Megbwema*
Gammalin ...	140	49
Aldrin	876	243
Control	No plot	167

308. The plots are too variable (in soil, age of trees, extent and severity of capsid damage etc.) to compare them directly one with another. An assessment of the trial will have to be based on the percentage improvement in each plot over a number of years. The minimum period for such a trial is two years.

309. *Capsid Population Studies.* The number of capsids found on a fixed site has been recorded at Kpuwabu. The collections were made in the period of one hour by one man every fortnight. These have shown that there is a very sharp population peak in September, with minimum numbers occurring in late May–June. It is of interest to note that this seasonal trend follows the pattern of that found in both Ghana and Nigeria. In all cases the peak population period occurs soon after the peak rainfall; although in both Ghana and Nigeria the *Sahlbergella* peak is not as sharp or pronounced as in Sierra Leone.

310. *Coffee Pests. Bixadus.* In 1960 a small pilot trial was laid out on an acre of mature Robusta coffee at Njala, with the view to controlling *Bixadus sierricola* (White), the coffee stem borer. Only one treatment was attempted, which consisted of a double application of 0.5 per cent dieldrin emulsion painted into the lower five feet of the coffee stems. The first application was made in December, 1960, the second in March, 1961. Assessment of the value of this treatment was based on the number of freshly attacked stems recorded in June, 1961, the results are tabulated below:—

	Control Plot	*Treated Plot*
Total Coffee Bushes	289	223
Damaged Coffee Bushes ...	82	11
Percentage Damaged	28.4	4.9

311. A fairly high degree of control was achieved, and a larger and more detailed trial was therefore planned, which was based on the above treatment. A 0.5 per cent dieldrin emulsion is still the only insecticidal solution being used, but the time and method of application and the length of stem treated are varied. Each treatment is combined with the others giving a total of eight plots, plus a control plot. There are thirty bushes per plot, and three replications of each plot making a total of 810 treated coffee bushes. The three replications are at Niagolehun, Kpuwabu and Pendembu. The first series of treatments in the trial were applied in December, 1961.

312. *Vegetable Pests.* During the first half of the year a considerable amount of time was spent in recording the habits and life cycles of insects found attacking vegetables. Possible means of control were also attempted with the various pests. The emphasis of the work was shifted from field recording, to the perusal and extraction of data from the relevant records and files. This has already been completed for five of the more important crops grown in Sierra Leone, and it is hoped that in the near future most of the important crops will have been dealt with including all the vegetable crops.

313. *Provisional Lists of Insect Pests.* All relevant literature, files and record cards of five major crops have been studied in detail with a view to producing lists of insects recorded damaging them in Sierra Leone. The five crops are avocado pear, cocoa, coffee, pineapple and rice. Other crops will be dealt with under different parts of the above list in subsequent years.

Systematic Botany Section

314. The Systematic Botanist and Ecologist was on vacation leave during July 15–December 13th.

315. *Vegetation Survey of the Bolilands.* The survey was carried out during February, 1960–June, 1961. All ecologically significant species were listed and their coverage estimated.

316. The vegetation can be classified into two broad groups, the *Lophira lanceolata* zone and the Riverain Forest. The *Lophira* zone which is a fire climax, consists of the following three associations.

317. Anadelphia/Rhytachne association occurs on sloughs characterised by acid or very acid gleisols that are flooded during the rainy season. The dominant union of *Anadelphia leptocoma* reaches its maximum seasonal development during October–November when it gives the bolis a reddish-brown appearance. Prolonged water-logging is deleterious to the species. On the other hand, *Rhytachne rottboeliodes*, the major component of the subordinate union, can stand prolonged water-logging. Even when *Anadelphia* is at the peak of its flowering activity, almost pure stands of *Rhytachne* can be seen in the form of low, greenish patches breaking the continuity of the reddish-brown *Anadelphia.* These patches are the depressions which hold water longer than the adjacent areas.

318. All the unflooded treeless areas of the boliland belong to the Chasmopodium/Nauclea habitat type which includes all the terrace remnants with ground-water laterite. The *Chasmopodium Nauclea* association occurs in the form of the tall *Chasmopodium caudatum* (and associated species) tying between the Anadelphia/Rhytachne association and the so-called "Lophira" bush. Occasionally, patches of *Chasmopodium* can be seen growing in the midst of Anadelphia/Rhytachne association. However, the former occurs on all soil a few feet higher than that of the latter, and is therefore, not continuously flooded. Under continued disturbance *Chasmopodium caudatum* is replaced by *Andropogon sabonensis.*

319. The riverain forests are found along the banks of almost all creeks and rivers of the bolilands. Most of them have been affected by fires, and they are therefore secondary. Further detailed studies are necessary to decide their present status. "Sacred Bush" is often met with along creeks and rivers and near habitations. These are low, sometimes high, forest patches locally associated with the supernatural.

320. A detailed report on the boliland vegetation has already been submitted for publication.

321. *Banana Survey.* The following is a summary of the detailed report already submitted.

322. A survey of the local varieties of Bananas was undertaken early in 1960. The reconnaisance in the Mende areas (including the Southern Province and the Kenema District of the Eastern Province) was completed in July 1961. Only the bananas grown sporadically in and around habitations were surveyed, and the comparatively recently introduced cultivars, like 'Gros Michel' and 'Poyo', were not studied.

323. The extensive survey of the investigated area yielded six banana cultivars. These are 'Manuva', 'Momonga', 'Jimingae', 'Mende Hedde', 'Red Momonga', and 'Dondogbomani'. Of these the first four are the "green" bananas and the others the "red". A key to identify them has been prepared. Detailed descriptions of the cultivars have been noted, and maps of their distribution drawn. All the six bananas appear to be triploid hybrid cultivars of the Eumusa series. The "green" bananas probably belong to the AAB group, and the 'Red Momonga' to ABB. Observation on 'Domdogbomani' are incomplete. Further work is under way to verify these findings.

324. The nomenclature of the bananas of Sierra Leone is in a state of confusion and after a thorough investigation of the problem it has been recommended that these bananas should *not* be interpreted in terms of the standard cultivars. Distribution patterns of these bananas and the possibilities of growing them as a cash crop have been discussed. The literature on their diseases and pests have been reviewed, and the possible future lines of research have been suggested.

325. *Ecology of Musaia Grasslands.* Representative sites were selected on some of the settlements near Gberia Timbako for a general vegetation survey of the area and for a study of succession on "warris" which include those abandoned in 1955, 1956, 1957, 1959 and 1960. Observations made so far indicate that the seral stages of succession on the "warris" are dominated by *Digitaria* sp., *Desmodium triflorum* and *Urena lobata.* Further studies extending over at least two more growing seasons are necessary to reach any definite conclusions.

326. *Poisonous Plants.* Investigations on the poisonous plants of Sierra Leone were started early in 1961. The Veterinary Department cooperated by carrying out feeding experiments. A thorough search for relevant information was made in the archives of both the Agriculture and Veterinary Departments.

327. The Director of Veterinary Services reported that as a result of the feeding experiments with sheep carried out in 1951, the following plants were found not poisonous:

(*a*) *Anthostema senegalense* (Euphorbiaceae).
(*b*) *Mareya Micrantha* (*Euphorbiaceae*), Department of Agriculture file No. 17/51 shows that in 1945 F.C. Deighton considered this species as "the common poison and abortifacant".
(*c*) *Casia* sp. (Caesalpiniaceae).
(*d*) *Pterocarpus santalinoides* (Papilionaceae).
(*e*) *Secamone myrtifilia* (Asclepiadaceae).

328. The 1951 experiments also showed that *Bersama abyssinica* subsp. *paullinioides* var. *pauliniodes* (*Melianthaceae*) was definitely poisonous; O.3 gm. per pound body weight was calculated to kill sheep in 7 hours.

329. Department of Agriculture records show that as a result of the experiment conducted in 1944, the Agricultural Officer, Teko, concluded that *Spigelia anthelmia* (Loganiaceae) and *Ipomoea involucrata* (Convolvulaceae) were *not* poisonous, and that *Tiliaccra* sp. (Monispermaceae) was highly poisonous. Unfortunately there are no records to show which species of *Tiliacora* was used in the experiments.

330. Notwithstanding all this, published information indicates that *Spigelia anthelmia* is poisonous. To settle this point, the Director of Veterinary Services carried out experiments using rabbits. He found that on'y the seeds of the species are poisonous, the poison being a cumulative akaloid of the Digitalis group. He however, noted that the species is not dangerous since it is unlikely that any animal would eat *S. anthelmia* seeds to the extent of 80 per cent of its total intake.

331. *Plant Collection and Indentification.* About 200 plants were collected and identified. Of these 57 were sent to Kew. A number of plants were identified for Musaia, Gberia Timbako and Njala. The names of all the carpological collections falling under the second edition of the Flora of West Tropical Africa, Vol. 1, have been revised.

332. Further collections of Parinari excelsa and Daniellia have been made from different parts of Sierra Leone with a view to settle their identity. The work will be continued in 1962.

Agricultural Chemistry Section

333. *Soil Surveys.* Two semi detailed soil surveys were completed during 1961. These were at Pendembu and Kpawubu. In addition a quick look-see survey was done on behalf of the Produce Marketing Board at Rokel and Mange. This was to choose a site for a large oil palm plantation. The Chemist recommended the Mange site and a semi detailed survey is to follow.

334. *Pendembu.* The soils on this farm and others in the vicinity indicate a better nutrient status than average. This fact combined with the shorter dry season makes this one of the best areas for cocoa cultivation. In general the soils are medium loans with a reddish colour and have been classified as red-brown ferrallitic soils.

335. *Kpuwabu.* As area of 150 acres was surveyed. A soil map was prepared having four basic units, an upland concretionary soil, a ground water laterite, a colluvial stone free soil and a swamp soil. The upland soils are classified as yellow-brown ferrallitic soils. They are generally poor with pH of 3.8 and only the lower colluvial soil being suitable for cocoa. This is mainly due to the shortage of moisture in the upper soil in the dry season. The station is marginal for cocoa and therefore the local practice to plant it only in valley bottoms in this locality is a good one.

336. *Laboratory work.* This was mostly concerned with the surveys mentioned above. In addition soil was analysed from experimental plots where fertilizer trials on groundnuts and cassava are being done. These analyses may eventually establish a relation between figures obtained in the laboratory and response to fertilisers in the field. A new technique was worked out in the analysis of the clay fraction for iron, alluminium and silica.

337. A series of grass analyses was done for the Agricultural Officer, Musaia. A new and more rapid method of crude fibre determination was adopted.

338. *Field Experiments.* (i) On Block 29 at Njala, cassava was used as an indicator crop to find correlation between laboratory analysis and field response with particular reference to P.K. Mg. Ca.

(ii) On a site at Senehun in Kono District groundnuts were used to find a response to increasing dressings of Superphosphate and whether at higher levels of phosphate there is a response to N, K, and Ca. This experiment was not very successful. No upper limit to the weight of Superphosphate was shown. 3 cwts. was the upper level in this trial. Nitrogen, Potash and Calcium all showed non-significant results.

K—Njala Training College

Academic Year September 1960–August 1961

339. In September, 1960 the Agricultural Instructors-in-Training analysis was as follows:—

Class IVa	
Agricultural Department Students	7
Gambian Students	3
	10
Class IIa	
Agricultural Department Students	9
Gambian Students	2
	11
Commercial Class	
Sierra Leone Produce Marketing Board	6
Sierra Leone Agricultural Corporation	5
Aureol Tobacco Company	2
	13
Class Ia	
On practical training at Outstations	28

340. In December three of the Commercial students had their appointments terminated ; the remaining ten successfully completed the course and joined their employers in July.

341. The ten final year Agricultural Instructors-in-Training all completed their courses and were posted as Agricultural Instructors by their department.

342. The first year class at outstations was reduced to thirteen in June due to resignations and failures in the college entrance examination.

343. The college transport continued to be unsuitable for trekking. Using rail transport the Commercial Class had a successful trek to Kenema, Makeni and Freetown.

344. In February and March, three short courses each of two weeks duration were conducted at Njala Training College for the training of Farm Demonstrators appointed under the National Economic Tree Scheme. In all 81 Demonstrators were trained in nursery and plantation work. The three

courses were most successful and a very pleasant but brief college career was actively enjoyed by all the participants. Their mark has been left on the college for future years because they planted a five acre of Oil palm plantation and no failures have been observed in the plantation.

345. The Massey Ferguson tractor and the Ransomes gang mower along with the two Hayter grass cutters enabled the college compound to be kept in good order throughout the year.

346. The nursery continued to supply the students with a large proportion of the vegetables used in the Dining Hall. A large variety of market garden crops were grown with varying success.

347. The farm continued to be strip cultivated as in previous years. The citrus fruit augmented the students diet but yields were generally low in most of the annual blocks. The coffee yielded moderately well.

348. No serious incidence of disease was found in either farm or nursery.

349. Poultry and rabbits continued on a small scale. Letters of applications for admission to Njala Training College to study Agriculture continued to come to the extent of almost 300 during the year. The majority of these applicants had a low educational background so most of the applications had to be rejected.

APPENDIX I

EXPORTS OF PRINCIPAL AGRICULTURAL PRODUCTS

	1938			*1958*			*1959*			*1960*			*1961*		
	Ton	*Value*	*Export Value per Ton*	*Ton*	*Value*	*Export Value per ton*	*Ton*	*Value*	*Export Value per Ton*	*Ton*	*Value*	*Export Value per Ton*	*Ton*	*Value*	*Export Value per Ton nearest £*
Bananas ...	1	2	—	19	431	22½	18	424	23	14.0	434	31	4.05	155	38
Beeswax ...	—	—	—	5	2,153	230	29	11,536	390	61.1	24,886	408	47.10	16,249	345
Benniseed ...	374	3,700	10	—	—	—	—	—	—	70.0	4,169	59	399.00	29,410	74
Calabar Beans ...	—	—	—	58	10,418	180	58	7,466	129	10.0	1,786	178	37.40	8,938	239
Cocoa ...	384	5,849	15	2,828	872,290	309	2,617	701,585	268	3,250.0	696,129	214	2,792.40	463,949	166
Coconuts (Fresh)	Nil	44	—	11½	298	26	8	286	36	6.0	187	31	5.90	150	25
Coffee ...	38	793	21	3,348	895,055	267	4,931	984,858	199	5,093.7	649,491	127	5,023.55	596,239	119
Ginger ...	2,705	60,680	22	789	70,050	89	1,054	102,668	97	552.1	73,239	133	591.70	80,639	136
Groundnuts ...	N.A.	5	—	—	—	—	—	—	—	—	—	—	—	—	—
Kola Nuts ...	1,450	29,785	20	1,035	135,227	131	742	111,633	150	1,371.0	149,833	109	959.55	99,087	103
Palm Kernels ...	63,697	457,031	7	54,609	2,448,256	47	57,530	3,175,621	55	54,525.0	2,916,803	54	7,764.00	2,437,622	42
Palm Oil ...	1,006	16,025	15	10	1,077	108	9	1,143	127	5.0	760	152	5.00	605	121
Pepper (D. Red)	90	3,410	38	¾	275	366	1	308	308	1.0	269	130	1.30	285	219
Piassava (Prime Sherbro)	—	—	—	789	43,176	55	586	34,062	58	640.8	43,855	68	474.98	34,230	72
Piassava (Sulima)	3,751	40,369	10	4,155	194,303	47	4,838	203,271	42	5,163.3	229,356	44	5,257.30	250,686	48
Total value of all main Agric., Exports ...	—	617,693	—	—	4,673,009	—	—	5,334,861	—	—	4,791,197	—	—	4,018,244	—
Total Tonnage of all main Agric, Exports ...	73,556	—	—	67,657	—	—	72,421	—	—	70,763	—	—	73,363.23	—	—

Appendix II

RAINFALL, 1961

Station	*Jan.*	*Feb.*	*March*	*April*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*	*Total*	*Average 10 years*
Musaia	0.00	0.00	0.00	2.96	9.65	10.71	11.39	14.44	18.93	10.53	4.43	0.00	83.04	80.21
Makeni	0.00	0.90	0.00	4.00	5.97	11.32	38.47	27.40	19.80	10.71	6.96	1.33	125.96	119.8
Kontobe ...	0.00	0.50	0.14	8.75	12.85	14.45	21.36	26.09	18.75	21.96	6.63	0.42	131.90	—
Katonga ...	0.00	N.R.	0.08	0.93	4.71	9.77	31.53	24.07	N.R.	13.79	2.57	0.00		—
Batkanu	0.00	0.00	0.00		—	STATION		CLOSED						116.49
Rokupr	0.00	0.00	0.27	1.67	4.03	10.31	22.78	32.64	25.74	12.54	9.34	Trace	119.33	116.66
Lungi	0.00	0.00	0.00	6.67	5.08	17.43	48.60	32.05	16.51	6.75	4.20	0.00	137.29	131.24
Newton	0.00	0.10	0.00	4.51	6.52	14.60	37.91	38.15	13.10	5.92	2.81	0.16	123.78	127.11
Waterloo ...	0.00	0.00	0.41	4.19	5.19	15.47	35.22	—		NO RECORDS				104.39
Hill Station ...	0.00	0.00	0.01	14.04	13.90	29.73	56.11	54.68	31.28	8.34	1.11	0.00	209.2	177.04
Lumley	0.00	0.00	0.76	5.29	3.65	27.44	58.70	38.24	24.72	9.90	0.79	0.10	169.59	162.54
Njala	0.00	0.20	1.29	2.96	10.12	8.38	17.16	25.15	21.81	12.43	4.92	0.96	105.38	109.82
Bo	0.00	0.26	0.68	8.15	9.31	7.69	22.84	27.04	15.00	14.16	5.17	0.05	110.35	116.49
Bonthe	0.15	0.21	0.46	6.47	7.82	28.44	36.19	39.18	24.63	8.67	4.25	Trace	156.47	150.96
Solon	0.65	0.48	0.29	5.55	8.66	26.90	46.47	33.64	24.45	14.87	3.23	0.35	165.54	—
Torma	0.05	0.05	1.13	5.09	12.56	20.32	45.71	33.14	22.22	15.19	2.09	0.00	157.55	160.99
Kenema Farm ...	0.00	0.51	0.83	4.46	9.18	10.14	26.68	23.61	22.95	13.05	3.82	0.04	115.27	110.31
Kailahun ...	0.00	0.00	0.00	6.13	5.81	8.89	12.95	16.92	22.12	16.71	N.R.	N.R.	—	115.39
Yengema ...	0.00	0.00	2.84	5.86	11.79	10.70	17.97	8.91	17.19	7.09	5.11	0.00	87.46	97.30
Kpuabu ...	0.00	0.27	1.40	5.61	11.86	15.71	15.79	17.74	13.85	12.22	7.52	1.30	103.27	—

Appendix III

COCOA GRADED AT VARIOUS CENTRES DURING THE YEAR 1961/62

Stations	*Grade I*	*Grade II*	*Grade III*	*Total Bags*	*Total Tons*
Kailahun	6,403	18	7	6,428	401.7
Pendembu	10,145	5	5	10,155	634.6
Baiima	4,277	9	3	4,289	268
Daru	7,967	37	—	8,004	500.2
Segbwema	9,501	—	—	9,501	593.8
Hangha	5,043	5	—	5,048	315.5
Kenema	10,216	48	—	10,264	641.5
Blama	3,467	8	—	3,475	217.1
Bo	535	38	11	584	36.5
Pujehun/Yonni	63	153	11	227	14.1
Gandorhun	2,763	—	—	2,763	172.6
Freetown	490	—	—	490	30.6

Appendix IV

RETURNS FROM COCOA GRADING CENTRES

	58/59	*59/60*	*60/61*	*61/62*
Blama	—	1,989	3,114	3,475
Kenema	—	10,321	10,122	10,264
Hangha	—	5,203	5,535	5,048
Segbwema	—	12,371	11,964	9,501
Daru	—	5,223	5,206	8,004
Baiima	—	3,537	4,580	4,289
Pendembu	—	9,248	8,430	10,155
Kailahun	—	4,719	5,750	6,428
Gandorhun	—	—	—	2,763
Station outside Eastern Province... ...	—	1,067	603	1,301
Total	—	53,678	55,304	61,228

Figure given above for *59/60* and *60/61* replace those of previous Annual Reports in which the figures are incorrect.

Numbering Trials. All field trials are numbered as in the past, using the block numbers in which the trials are planted.

Nursery trials are given the following numbering system.

EXP. No. KP. (KPUWABU) or Pe (PENDEMBU) N (NURSERY Followed by an index number.

EXP. No. KP. No. II. During 1959–60 it was noticed that cocoa seedlings sown several to basket and then later transferred to separate baskets gave better growth than if raised separately. This observation was tested in a nursery trial. In three different dates of transplanting it was found that in all cases the transplanted seedlings were smaller than the seedlings sown separately.

The difference was small for seedlings transplanted after one month but increased as the age prior to planting increased. None of the differences was significant.

From the results obtained in this trial it would appear that there is no advantage to be gained by planting cocoa seedlings several to a basket and then transplanting them into single baskets.

EXP. No. KP. No. III

Type of Basket. The experiment was carried out to compare different types of potting basket. The pots used were: Bamboo Pots, Polythene pots and Wire baskets.

It was impossible to obtain accurate results from this experiment because only single basket plots were used and if one of the seedlings died then there was a whole plot without results.

Several seedlings in the Bamboo Pots died and it had to be decided whether to analyse the results counting a dead seedling as showing no growth or to make an estimate of what the growth might have been made had the seedling remained alive.

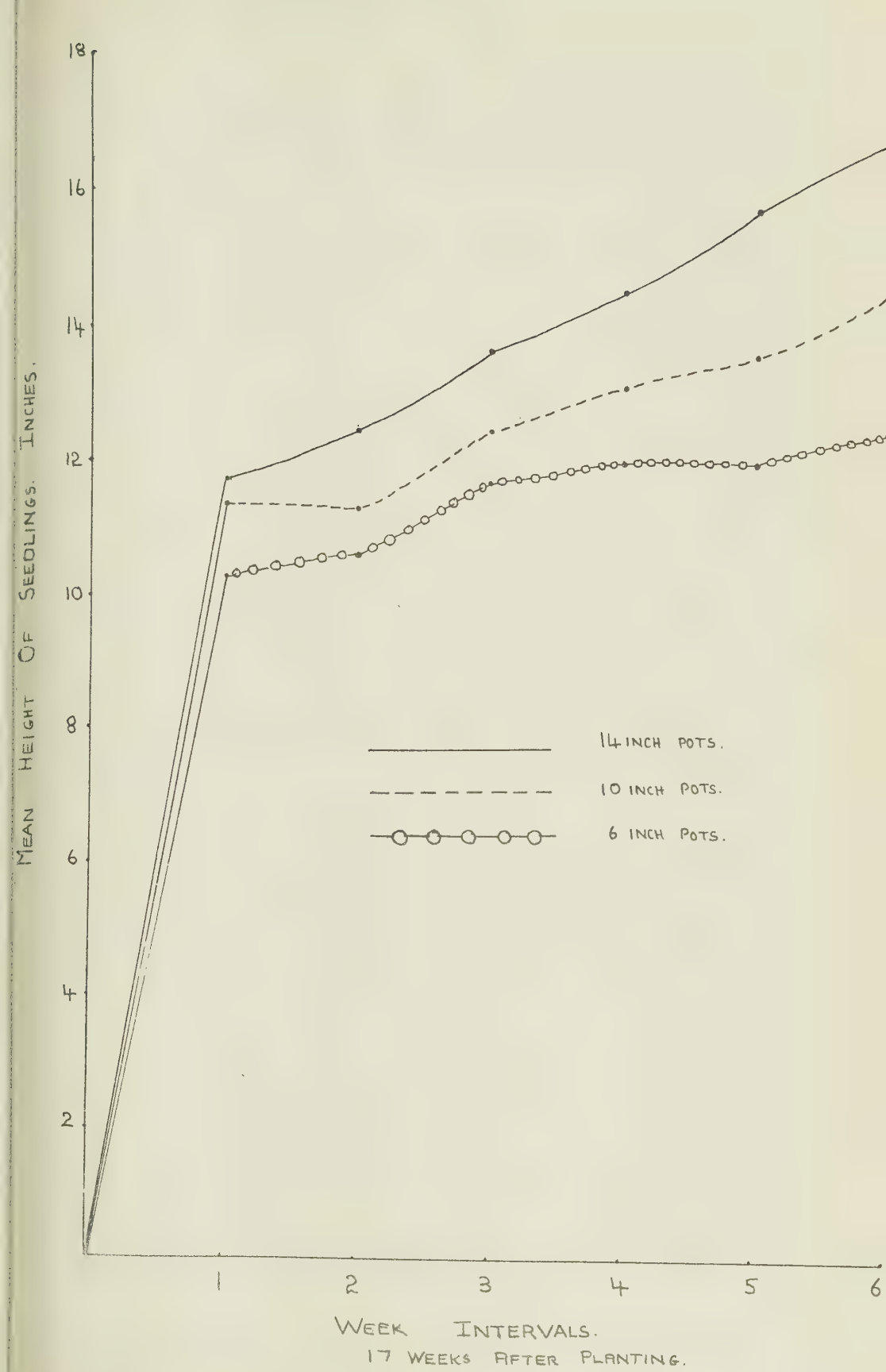
If the former method is used then the Wire Baskets show a significantly greater growth than Bamboo Pots. If the latter method is used then there is no significant difference between the pots.

The important point to note from the results is that single pot plots are not large enough in this type of experimental work. The reasons are two. If a seedling dies no results are available and secondly the growth of cocoa seedlings shows quite a high variation from pot to pot and it is necessary to use plots consisting of not less than eight pots.

EXP. No. KP. No. IV. This experiment was designed to compare the growth of cocoa seedlings in pots of varying height but of constant cross sectional area. The pots used were 6 inches, 10 inches and 14 inches high.

The cocoa seeds were planted in December and by June 21st the average height of the seedlings were:—

	Inches High
14 inch pots	16.8
10 inch pots	14.3
6 inch pots	12.6


18
16
14
12
10
8
6
4
2
Mean Height Of Seedlings. Inches.
14 inch pots.
10 inch pots.
6 inch Pots.
1
2
3
4
5
6
Week Intervals.
17 weeks After Planting.

The accompanying graph shows the relative growth rates and if the results are compared with the speed at which the tap root of a cocoa seedling grows then it can be shown that seedlings grown in different size pots will show the same growth until the size of the basket begins to inhibit the growth of the tap root.

The results show the depth of pot to be used in a cocoa nursery is controlled by the age and size that the seedling is required to be, before it is planted out in the field. The younger the seedling to be planted out then the smaller can be the pot used.

The seedlings from this experiment have been planted out in the field and growth records are being kept.

EXP. No. KP. N.V. During the 1958–59 season it was thought that cocoa seedlings which were raised on a platform above the ground, grew higher and thicker than did seedlings that were left on the ground.

An experiment was designed to test the above theory and the results can be summarised as follows:—

	PLATFORM		*ON THE GROUND*	
Height		*Diam.*	*Height*	*Diam.*
12/12/60 ...	6.28 inches	3.18 m.m.s.	5.82 inches	2.5 m.m.s.
13/3/61 ...	11.21 inches	5.58 m.m.s.	8.38 inches	4.86 m.m.s.

The seedlings were sown on 12th September, 1960 and by 12th December, 1960 it can be seen that the seedlings on the platform were already higher and thicker than those on the ground.

By 13th March, 1961 the differences between the platform and the ground were 2.83 inches in height and 0.72 m.m. in diameter.

The opinion is expressed that the differences are caused by a difference in the intensity of the shade. The shade being less for the seedlings raised on the platform.

The experiment is being repeated in 1962.

EXP. No. KP. VI. This experiment was designed to trace the rate of root development. The experiment was incorrectly carried out and no results obtained. The experiment will be repeated in 1962.

EXP. No. KP. VI. This experiment was designed to compare seven different types of Top Soil when they are used as a potting soil for cocoa seedlings. The seven types of Top Soil used were:—

1. Kono Top Soil
2. Swamp Top Soil
3. Town Dirty
4. Forest Top Soil
5. Bamboo Grove Soil
6. Laterite Top Soil
7. Valley Bottom Top Soil.

The words "top soil" confine the soil used to that occurring in the top six inches of the profile.

A Latin Square design was used with 16 pots per plot. Each plot was split to test the application of a fertilizer mixture.

Amelonado seeds were planted one to each basket on 16th September, 1960. By 7th October, 1961 it could be seen that many of the germinated seeds were rotting just below the cotyledons. The following counts were made:

Soil Type	*No. Rotten*		*Mean*
Valley Bottom + F	30	47	6.7
Valley Bottom	17		
Kono + F	39	79	11.3
Kono	40		
Swamp + F	18	65	9.4
Swamp	47		
Town Dirty + F	45	89	12.7
Town Dirty	44		
orest + F	15	33	4.7
Forest	18		
Bamboo Grove + F	36	57	8.1
Bamboo Grove	21		
Laterite + F	24	37	5.3
Laterite	13		

It is fairly safe to say that the fertilizer application had no effect upon the number of seedlings that died.

An analysis of variance of the above results showed that the Forest, Bamboo Grove, Laterite and Valley Top Soils all showed very significantly less deaths than did, Town Dirty. The seven soils can be grouped as follows:

Least number of deaths	Forest, Laterite, Valley
Medium number of deaths	Swamp and Bamboo
Greatest number of deaths	Town Dirty and Kono.

It was clear that the seed was planted too early in the season and that the baskets became too wet setting up ideal conditions for "Damping-off" fungus. *See* Tropical Agriculture Vol. 36 No. 2. April 1959.

The experiment was completely replanted, and very few deaths of the young seedlings were observed.

Variety Trials

Kpuwabu Ref. 30/June 1959. This trial was designed to test a number of West African Cocoa Research Institute crosses. The following crosses were used in the trial:

Series 1. G. D. M. P.
Series 11. A. E. F. J.

No control plots of local Amelonado cocoa were planted.

Block 30 is on Laterite gravel and was chosen for its proximity to a main trial; not for its suitability for cocoa.

That the soil is not suitable for cocoa can be seen from the number of trees still alive two years after planting. Only 124 out of 288.

It is considered that the following table gives very important results. They are therefore discussed in detail in the following paragraphs.

Variety	SEPTEMBER, 1960 No. Alive	% Death	SEPTEMBER, 1961 No. Alive	% Death
11 A	25	30.5 %	11	69.3 %
1 G	30	16.6 %	24	33.3 %
1 D	31	13.8 %	12	66.6 %
11 E	33	8.3 %	19	47.3 %
11 F	31	13.8 %	18	50.0 %
11 J	26	27.7 %	16	55.5 %
1 M	24	33.3 %	15	58.3 %
1 P	23	36.1 %	9	75.0 %
	223 Mean	22.5 %	124	57.0 %
Death rate as per cent of Plant Alive at the beginning of year		22.6 %		44.7 %

The above table shows that 14 months after planting 22.5 per cent of the seedlings had died and 26 months after planting 57.0 per cent of the seedlings had died.

Even more important are the final figures given in the table above. The death rate during the first 14 months was 22.6 per cent but during the next 12 months the death rate doubles to 44.7 per cent.

It is thought that this large increase in the death rate is explained by the simple fact that the larger the plant grows the more moisture it requires from the soil. Whilst the seedling is still young it's transpiration rate is relatively small and with the small root development at this stage plus the moisture which is held in the rich potting mixture surrounding the roots then a large number of the seedlings are able to survive the first dry season after planting out.

After another 12 months the transpiration area will have increased, the surface feeder roots will have grown longer and cover a larger area whilst the tap root because of the extremely hard nature of the soil will not have been able to grow to a sufficient depth to be in moisture carrying soil in the dry season. Therefore the older the plant becomes the more difficult will it be for it to survive a severe dry season.

It is considered that the results from Experiment 107/June 1959 help to support the above theory. The experiment is planted on colluvial soils containing a much higher percentage of clay than the Upland soils of Exp. 30/June 1959. Seedlings died in Exp. 107/June 1959 but none died during the second, more severe dry season. It would appear that exactly the opposite effect takes place on Colluvial Soils compared to Upland Soils. The older the plant becomes the better it can withstand a severe dry season. The tap root of a cocoa seedling is able to grow down through the material of the colluvial soils and as these soils do not dry out as quickly as the upland soils then the tap root system is always in soil where moisture is available.

It was originally thought that the main problem of the Kpuwabu Upland soils was in finding a successful method of establishing cocoa seedlings. From the facts outlined above it would appear that the main problem is to find a way of keeping the plants alive once they are established. In any case the results do tend to show that cocoa is unsuited to the Upland soils as occur at Kpuwabu and that it will only grow under an uneconomic system of heavy mulching and/or irrigation.

It would appear that establishment is still a minor problem on the Valley soils and that this probem could be solved by finding the best time of the year to plant out the seedlings. This is of importance because many of the valley soils are waterlogged for long periods during the wet season.

Because of the high death rate it is impossible to obtain any information concerning the relative merits of the eight varieties, except perhaps to say that variety IG is more drought resistant than the others.

EXP. REF. 135/140 June 1959. This experiment was designed to compare a number of W.A.C.R.I. crosses using local Amelonado as a control.

Variety	*Mean Height Feet*	*+—Test*
Amelonado	5.4	—
1 G	5.2	— 0.2 N.S.
1 Q	5.5	+ 0.1 N.S.
1 P	5.6	+ 0.2 N.S.
11 N	7.2	+ 1.8*
II K	7.2	+ 1.8*
11 J	6.7	+ 1.3*
11 D	5.0	— 0.4 N.S.

Least Significant Difference

5 %=0.832
1 %=1.132
0.1 %=1.54

The analysis of variance for the height measurement shows that varieties IIN and IIK have given a significantly greater amount of growth than the other varieties.

Variety	*Mean Number Surviving per Plot*	
Amelonado	13	
1 G	14	N.S.
1 Q	12	N.S.
1 P	10	
11 N	14	N.S.
11 K	12	N.S.
11 J	14	N.S.
11 D	11	*

L.S.D. 1.399
1.905
2.570

The above analysis of the number of seedlings surviving shows that none of the series 1 and series 11 varieties has a significantly greater survival rate than local Amelonado.

Varieties IIP and IID have significantly lower survival rates.

Kpuwabu Ref. 107/June 1959. This is a small trial that was designed to compare the following W.A.C.R.I. crosses 11D, 11N 1C.

Design	*Randomized Block*
Replicates	4
Trees per plot	16

Variety	*Mean Height*
1 C	6.45 feet
11 N	6.15 feet
11 D	7.02 feet

Least Significant Difference

5%	0.638 feet
1%	0.944 feet

The trial shows no significant differences between the three varieties.

An analysis of variance was carried out on the stem diameter records. The results showed a high experimental error and this is considered to be due to the stem diameter not being taken at a constant height from the ground. Because of the high experimental error no significance could be drawn from the results.

Kpuwabu 40/41 June 1959. This trial was designed to compare several W.A.C.R.I. series 1 and 11 crosses. Local Amelonado was planted as a control variety.

The following varieties are on trial:—

IC, 1Q, 1P, 11D, 11J, 11N, 11K, local Amelonado.

Design — *Randomized Blocks*

Replicates	... ...	4
Varieties	... ...	8
Plots	... ...	16 trees per plot. Each plot divided into 4, and within each variety seedlings from 4 different pods are compared.

Planting distance 9'x9'

Results	*Mean Height*	*Mean Diameter*	*No. Surviving*	*% Surviving*
Amelonado ...	5.2 feet	24.4 m.m.	49	76.5%
11 D	4.7 feet	22.9	36	56.3%
11 J	4.8 feet	25.8	35	54.7%
11 N	5.4 feet	30.5	34	53.1%
11 K	4.9 feet	21.9	32	50.0%
1 C	4.3 feet	23.0	44	68.8%
1 Q	4.6 feet	23.9	30	46.9%
1 P	3.8 feet	17.9	25	39.0%

Co-efficient of Variation.
13.2% 19.7%

It can readily be seen that there are differences between the varieties, but as these do not reach statistical significance no conclusion can be drawn.

The analysis of variance for numbers surviving showed a very significant difference between varieties.

Variety	*Mean No. Surviving*	*Difference over control*
Amelonado	... 12.0	—
11D	... 9.0	— 3.20
11J	... 8.75	— 3.25
11N	... 8.5	— 3.5
11K	... 8.2	— 3.8
1C	... 11.0	— 1 N.S.
1Q	... 6.2	— 5.8
1P	... 7.5	— 4.5

5%=1.397
1%=1.902
0.1%=2.61

From the above table it can be seen that all varieties except 1C have given a significantly lower survival rate than the Amelonado.

This is a rather surprising result, and contrary to expectation however the results do seem to show that if Amelonado seedlings are grown in baskets and given a really good start, then their survival power on the upland soils of Kpuwabu is significantly greater than that of the W.A.C.R.I. crosses.

Unfortunately the above results do not agree with those on other upland trials.

Kpuwabu 50/51/52 July 61. This experiment was designed as a large variety trial to compare the following varieties of the W.A.C.R.I. series I crosses.

A, D, N, Q, V and local Amelonado.

The seedlings were planted at the end of June 1961, but there were insufficient Amelonado seedlings to plant up all the guard rows. These will be planted in June, 1962.

Design	*Randomized Block*
Replicate ...	... 7
No. of trees per plot	... 16 planted 2x8
Guard Rows ...	... One guard row between each plot. Two guard rows around the whole experiment.

Kpuwabu 22/32/52 June 61. This experiment was designed as a large variety trial to compare the following varieties of the W.A.C.R.I. series11 crosses.

A, B, C, E, G, L and local Amelonado.

The seedlings were planted at the end of June, 1961 but there were insufficient Amelonado seedlings to plant up all the guard rows. These will be planted in June, 1962.

Design	*Randomized Block*
Replicates ...	... 7
No. of trees per plot	... 16 planted 2x8
Guard Rows ...	... One guard row between each plot. Two guard rows around the whole experiment.

Pendembu Ref. 89/90/91 July 1961. This experiment was designed as a large variety trial to compare the following varieties of the W.A.C.R.I. series 1 crosses.

A, D, V, N, Q, T, R, X, W and local Amelonado.

The seedlings were planted in early July, 1961, but there were no Amelonado seedling available to plant up the guard rows. These will be planted in June, 1961.

Design	*Randomized Block*
Replicate ...	... 7
No. of trees per plot	... 16 Planted 2x8
Guard Rows ...	... One guard row between each plant. Two guard rows around the whole experiment.

Pendembu Ref. 160/161/162 July 1961 This experiment was designed as a large variety trial to compare the following varieties of the W.A.C.R.I. series 11 crosses.

A, B, C, E, G, H, L and local Amelonado.

The seedlings were planted in early July 1961, but there were insufficient Amelonado seedlings to plant up all the guard rows. These will be planted in June, 1962.

Design	*Randomized Block*
Replicates ...	... 7
No. of trees per plot	... 16 Planted 2 x 8
Guard rows ...	... One guard row between each plot. Two guard rows around the whole experiment.

Establishment Trials

Kpuwabu Exp. 38/39 No. 9 Upland. Because of the high cost of transport and the difficulty of finding large quantities of potting material every year for the nursery, there are obvious advantages in distributing seedlings with bare roots.

A pilot experiment in 1959 comparing bare root with basketed seedlings, showed no significant advantage to basketed seedlings, but in that trial the seedlings were only left with bare roots for three hours.

Design 5 x 5 Latin Square.

No. Plants per plot. 9. 4 ft 6 ins. x 4 ft. 6 ins.
Treatments 5

(1) Control seedlings planted straight from baskets. C.
(2) Basketed seedlings transported by day. BD.
(3) Basketed seedlings transported by night. BN.
(4) Bare root seedlings transported by day. RD.
(5) Bare root seedlings transported by night. RN.

The analysis of the height recording showed a significant treatment effect.

Treatment	*Mean*	*Difference From Control*	*Difference Bare Root V Baskets*
C ...	2.9 feet	—	—
BD ...	2.14 feet	— 0.62 feet**	—
BN ...	2.26 feet	— 0.70 feet**	+ 0.88 feet
RD ...	3.08 feet	+ 0.12 feet	—
RN ...	3.08 feet	+ 0.12 feet	—

L.S.D. 5%	... ...	0.3924 feet
1%	... ...	0.5710 feet
0.1%	... ...	0.8579 feet

Analysis of Diameter Recordings

C	12.36 m.m.	
RD ...	7.56 m.m.	— 4.8 m.m.
RN ...	8.38 m.m.	— 3.98 m.m.
B.D. ...	12.54 m.m.	+ 0.18 m.m.
BN	12.8 m.m.	+ 0.44 m.m.

L.S.D. 5%	... ...	1.646 m.m.
1%	... ...	2.395 m.m.
0.1%	... ...	3.599 m.m.

*+ 4.75 m.m.

SURVIVAL RATE

Treatment	*No. Surviving*	*% Survival*
C	... 45	100
RB	... 29	64
RN	... 40	88
BD	... 45	100
BN	... 45	100

The results of this experiment show that on the upland soils of Kpuwabu there is a significant reduction in growth both in height and diameter when cocoa seedlings are transplanted using a bare root system of the transplanting. The bare root seedlings were 0.88 ft. shorter in height and 4.75 m.m. smaller in diameter. There was no difference in growth between

the seedlings transported during the night and those transported during the day. Figures for numbers of seedlings surviving show that there were a significantly greater number of deaths from the seedlings transplanted with bare roots whilst the number of deaths is greatly reduced if the bare root seedlings are transported at night.

The above trial was repeated exactly on a Valley Bottom Soil—Joru Red.

Kpuwabu Exp. 134/135 No. 9 Valley

ANALYSIS OF HEIGHT RECORDS

Treatment	*Treatment Mean*	*Difference from Control Difference*	*Bare Root Baskets*
C	2.94 feet	—0.6 feet*	
RD	2.34 „	—0.52 feet*	
RN	2.42 „	—0.52 feet*	0.8 feet*
BD	3.26 „	+0.32 feet N.S.	
BN ...	3.08 „	+0.14 feet N.S.	
L.S.D. ...	... 5% ...	0.456 feet	
	1% ...	0.664 feet	
	9.1% ...	0.993 feet	

ANALYSIS OF DIAMETER RECORDS

Treatment	*Treatment Mean*	*Difference from Control*	
C	11.9 m.m.	—	
RD	8.4 m.m.	— 3.5 m.m.*	4.0*
RN	8.9 m.m.	— 3.0 m.m.*	
BD	12.4 m.m.	+ 0.5 N.S.	
BN	12.9 m.m.	+ 1.0 N.S.	
L.S.D. ...	5% ...	... 1.59 m.m.	
	1% ...	... 2.32 m.m.	
	0.1% ...	... 3.48 m.m.	

SURVIVAL RATE

Treatment	*No. Surviving*	*% Survival*
C ...	... 34	75
RD ...	... 37	82
RN ...	... 37	82
BD ...	... 34	75
BN ...	... 38	83

The results of this trial agree with the results from the upland trial except for the number of seedlings surviving.

Bare root seedlings were on the average 0.8 ft. shorter than the basketed seedlings and 4.0 m.m. less in diameter.

The number of seedlings surviving show a very surprising result. The overall survival rate is much lower than on the upland soils and there are no significant differences between the treatments. It would appear that for some reason as yet unknown, the establishment of cocoa seedlings on the Kpuwabu valley soils is more difficult than on the upland soils.

The opinion is expressed that the high death rate may be caused by water logging of the soil when the seedlings are planted out.

EXP. Kpuwabu 24/25 No. 11

EXP. Kpuwabu 144/139 No. 11

In his 1959 report Mr. Glendinning advised that the first approach towards solving the problem of successfully establishing cocoa plants, should be the use of nursery grown seedlings.

Basketed seedlings are the best planting material but their distribution to farmers is very difficult and attempts should be made to establish bare root seedlings.

The second approach, advised by Glendinning, should be the use of fertilizers in establishment, and the third approach should be to find a good method for the control of the bush.

An experiment was designed by Glendinning and it was subsequently put down on both upland and valley soils.

Design. The design appears to be a Randomized block design with three splittings of the main plots.

Replications Treatments 3. Main Plots
Bush treatment
1. Clear Felled
2. Under Brushed
3. Partially Cleared

Sub plots—Fertilizer
No. Fertilizer
Sub—sub plots
Times of Planting.
A. June
B. July
C. August

Sub, sub, sub plots Type of seedling
b. Basketed
r. Bare root

The fertilizer mixture used was made up as follows:—

168 lb. Sulphate of Ammonia
168 lb. Superphosphate
37 lb. Sulphate of Potash
37 lb. Magnesium Sulphate.

4 ozs. of the above mixture was mixed with the soil in the planting holes one day prior to planting.

Spacing. 4 ft. 6 ins. x 4 ft. 6 ins.

Plants per plot.

Main plots	144
Sub plots	72
Sub, sub, plots	24
Sub, sub, sub plots	12

The first results of this important trial will be made available at a later date.

SEED AT STAKE TRIAL

EXP. KPUWABU 14/15 No. 10

EXP. KPUWABU 140/145 No. 10

Basketed seedlings are the best planting material but their distribution to farmers is difficult and expensive. It was therefore decided to put down a trial to compare various methods of planting seeds at stake.

Two trials were laid down. One on the Upland, Kpuwabu soil series and the second on the Valley, Joru Red soil series.

The trials were of exactly the same design as the one of Exp. Kpuwabu, 24/25 No. 9 and Kpuwabu 144/139 No. 9.

No detailed results can be given for this trial but it can be stated that the number of seedlings surviving is very low and planting seed at stake is not yet a successful method of establishing cocoa.

Fertilizer trials on standing cocoa

Two trials were designed and put down during the year. Both trials were on cocoa plots that had been used by the Plant Pathologist for Black Pod spraying trials.

One trial is at Kpai, situated five miles from Kenema on the side of the Kenema to Blama road. The other trial is at Neikabo, situated 11 miles from Kenema on the side of the Kenema Kombema road.

All the trees on each plot have been yield recorded for three years prior to the first application of fertilizer.

KPAI. EXP. COCOA KEN. NO. 1. The area comprises approximately 6 acres of 215 trees standing on the North side of the road and 1.1 acres of 407 trees standing on the South side of the road. The area was split up into 24 plots of equal area but not containing the same number of trees. It will therefore be necessary to reduce the results to a yield per tree basis. There are four treatments and six replications.

The following fertilizers were applied:

1. Nitrogen in the form of Sulphate of Ammonia at 100 lb. N. per acre. The dressing to be applied in two parts, half before the beginning of the rains and the second half in October.
2. Phosphate in the form of Superphosphate at 100 lb. P205 per acre. All applied before the beginning of the rains.
3. Potassium in the form of Potassium Sulphate at 75 lb. K20 per acre. All applied before the beginning of the rains.
4. Magnesium in the form of Magnesium Sulphate at 30 lb. Mg0 per acre. All applied before the beginning of the rains.

The treatment combinations used were:

1. N.P.
2. K Mg.
3. N P K Mg.

Unfortunately the fertilizers were not applied until June, which was too late. This year the main fertilizer application will be made in March. It would appear that there was no increase in yield because of the first application of fertilizer. Total yields over the past four years are given below:

1958	...	...	10,374	pods
1959	...	...	15,146	pods
1960	...	...	15,024	pods
1961	...	...	15,560	pods

The cost of the experiment up to December, 1961 was £78 17*s.* 1*d.*

Neikabo. This trial is of exactly the same design as the Kpai trial except that there are seven replications. The plots are almost the same size and the same fertiliser treatments were applied. The total area of the trial is 1.9 acres containing 1,066 trees.

No results are yet available.

The total cost of the trial up to December, 1961 was £82 3*s.* 10*d.*

APPENDIX XXVI

EXTRACTS FROM GOVERNMENT WHITE PAPER ON NATURAL RESOURCES

CP (61) 96 ANNEX I

II Agriculture

"(i) *General.* Much solid, valuable work has been done in the past by the Department of Agriculture's research services in ascertaining the type and species of crops best suited to the peculiar and varying conditions of Sierra Leone. Much of this knowledge has been disseminated by the Department's extension services, which are, it is admitted, still woefully inadequate. Hitherto the Department has confined its activities to research and advisory services, and it is now felt that while the vital research work must be continued and expanded, much money must be spent on switching the emphasis on advisory services to actual direct supervision of productive effort. The effect of much of the advisory work done in the past has been nullified because of the farmer's lack of capital, lack of know-how, and lack of incentive.

It is proposed, therefore, to meet these difficiencies by providing farmers with credit facilities. This much needed capital will enable farmers to reach beyond subsistence farming into the realms of a cash economy.

Government fully recognizes the fact that an agricultural credit scheme can never be successful, unless there is adeqate technical supervision, by the agricultural extension service, of farmers and organizations to whom advances are made, and unless a suitable method is evolved for the collection of repayments. The existing extension services will therefore be re-organized to give intensive supervision to organizations and farmers receiving credit under the scheme. Extension staff will not be used as debt collectors. Other methods for the collection of repayments are under consideration.

To combat the lack of know-how, it is proposed to give high priority to the training of extension workers. The establishment throughout the country, of Rural Training Institutes is contemplated. Negotiations are proceeding between Government and the International Co-operation Administration which, it is hoped will result in the foundation of the first of such Institutes. Practical courses, covering all aspects of rural life, will be given at these Institutes, and will be carefully tailored to suit the needs of the new countryman and woman. Farming will occupy a more prominent place in the curriculum of primary schools, and will be given much more publicity than it is receiving at present.

The lack of incentive is another barrier to efficient farming in Sierra Leone. The farmer who produces more and better produce with the financial and technical assistance of Government, and then finds he cannot obtain a fair price from middle men, will soon become discouraged and suspicious of Government's motives. To rectify this, Government intends to make adequate provision in the way of cold storage and marketing facilities for producers of meat, fish, vegetables and fruit. By establishing these marketing facilities, it should be possible for Government not only to guarantee fair prices to producers, but to ensure a better and cheaper distribution of foodstuffs throughout the country. For this purpose, Government-supervised marketing co-operatives will be given every encouragement.

(ii) Agricultural Credit Scheme:

(a) General

The provision of credit capital to farmers is normally the functions of banks in countries which are advanced agriculturally. In Sierra Leone, however, where most farmers are unable to offer that degree of security which is reasonably demanded by the banks, the duty of promoting such credit capital must fall to Government. Government therefore intends to supply credit capital to farmers to enable them to undertake either individual or collectively specific plantation projects or agricultural settlement schemes, which are considered to be economically viable. Priority will be given to applications from already established co-operatives of farming associations, local government agricultural institutions, and individuals, who on past performance have shown the energy and intelligence to apply successfully the advice given to them by the Department of Agriculture.

Credit capital will be provided to successful applicants in the form of capital equipment (e.g. machines, buildings, etc.) and provision of services (e.g. initial bush clearance by heavy machinery).

The chief criteria for the consideration of any project will be the project's economic viabiltiy (i.e. whether the project is likely to be commercially profitable), and its technical feasibility, having regard to the need to follow the tenets of good husbandry.

Government has in mind the following agricultural projects would be eligible for consideration for loans:—

(i) Plantation crops:

Coffee	Mangoes
Cacao	Rubber
Bananas	Oil Palms
Pineapples	Coconuts
Citrus	Cotton

(ii) Poultry rearing
(iii) Piggeries
(iv) Cattle-rearing
(v) Poultry, egg and pig processing
(vi) Market gardening
(vii) Rice Milling
viii) Portable sawmilling units
(ix) Rice farming.

In addition, applications for coffee hullers, cassava graters, oil palm processing machinery, formerly dealt with by the Development of Industries Board, would receive consideration.

(b) Administration

The Director of Agriculture will administer the scheme. He will receive advice on applications from Agricultural Credit Boards, one being established in the Colony area and one in each Province.

Agricultural Credit Boards, which will be advisory to the Director of Agriculture and which will have no executive functions, will consist of:—

(i) The Agricultural Officers of the circles in the area for which the Board is constituted, the Senior Agricultural Officer being the Chairman of the Board;

(ii) One representative from each District Council in the Province appointed by the District Council;

(iii) A number of members, representing farmers in the Province, equal to half the number of District Council members and Agricultural Officers, to be appointed by the Minister.

The Agricultural Credit Boards will be assisted by:—

(i) One Secretary

(ii) One Surveyor

(iii) One Sub-accountant at Headquarters to operate the accounts of the four Boards.

These officers will all be members of the Department of Agriculture, who would undertake the work of the Agricultural Credit Boards as part of their normal Government duties.

(c) Conditions attached to Loans

Government intends that:—

(i) Loans will only be granted in respect of projects which are technically feasible and stand a good chance of being commercially profitable;

(ii) An applicant for a loan must obtain the written consent of the Tribal Authority that the land he proposes to develop can rightfully be farmed by him, before the Board considers his application;

(iii) Loans will bear interest at the rate of 1 per cent above the current London bank rate;

(iv) Repayment of loans will begin, subject to the Minister of Natural Resources' discretion, one year after a notional "production day", which will be specified in every loan agreement, having regard to the type of crop involved;

(v) The Minister of Natural Resources will be empowered to extend the period of repayment of any loan, and to its writing-off in the event of unusual natural circumstances, such as droughts and floods.

(d) Security for Loans

The Government intends to accept as security for a loan the land offered for any project, the Tribal Authority acting as trustees of the land. (For example where an agricultural project fails through the fault of the farmer, the Tribal Authority would, it is envisaged, be empowered to replace the defaulting farmer by another, so that the project could be continued).

(e) Allocation of Costs to Farmers

The cost of establishing an assisted project will be eligible for credit under the scheme. Such costs would include the surveying, clearing and preparation of the land, the erection of stores and farm buildings, rent for the use of clearing machinery (which would include an element for the cost of fuel and drivers' wages), upkeep of the farm or plantation until it came into production, and labour costs, including allowances to the farmer.

(*f*) *Allowances to Farmers*

Agricultural Credit Boards will be given the authority to recommend to the Director of Agriculture cases where they consider that a small allowance should be paid to a farmer developing his land under the credit scheme, until such time as the project comes to fruition.

V—Livestock

(*a*) *General.* It is Government's intention that the research and extension work at present being carried out by the Veterinary Department should be continued, and expanded as and when funds permit. The claims of the Colony area will receive consideration in view of the rapid increase in pig and poultry production.

It is intended that one Mobile Newcastle Disease Unit will be established in 1961/62. This unit will be able, once it has gained operational experience, to inoculate about 250,000 fowls every year, or some 10 per cent of the national poultry flock. A second unit will be established as soon as is practicable.

At present, the vast majority of Sierra Leone's national cattle herd is raised in Koinadugu and Bombali Districts. Assistance will be given to farmers in other parts of the Northern Province and in the South-eastern and South-western Provinces to establish cattle herds and to go in for appropriate systems of mixed farming.

(*b*) *Livestock Marketing.* The lack of adequate marketing and cold storage facilities are two of the main obstacles to the development of the livestock industry. Government therefore intends to give hight priority to the establishment of cattle co-operative marketing systems, especially in Koinadugu District.

Government has decided to investigate the feasibility of building at Makeni a cold storage unit and modern abattoir, to which cattle from the Kabala and Kamakwie areas could be driven, and from which the frozen carcasses might be distributed by refrigerated rail wagons.

VI—Export of Agricultural Products

Government intends to give every encouragement, including credit facilities, to producers of export crops to increase their output. This will be an additional benefit to the economy because of the foreign exchange which will be earned, and also because of the increased cash which it will put into the hands of farmers.

It is intended that Sierra Leone should seek new trade outlets for her agricultural produce, while at the same time maintaining and strengthening her traditional contacts with Europe and America.

VII—Foreign Investment in Sierra Leone

Government will welcome foreign investment in plantation enterprises such as, for example, banana and rubber plantations, and will afford investing companies generous tax and customs concessions.

It is, however, Government's policy that where foreign companies propose an investment in a project which involves the use of land, a clause should be included in any agreement which will make it possible for Government and local investors to participate in the company by means of the purchase of a limited number of shares.

VIII—By-products

Government is conscious that full use is not being made of the by-products of the rice mills, the sawmills and of the fishing industry.

It is proposed therefore that a study should be made of the possibilities of turning to good account such by-products.

IX—Agricultural Loan Bank

Consideration is being given to the establishing of an agricultural loan bank in Sierra Leone, and to ways and means of attracting external finance to such a bank. A number of local problems, however, still have to be solved before this can be taken much further.

Chief among these is the problem of land tenure. Government has requested the United Nations Technical Assistance Board to provide an expert on land tenure to examine this whole problem and to make recommendations. Information has recently been received that this request has been approved for 1961.

X—Legislation

The legislation required to implement Government's policy on natural resources will be introduced shortly.

XI—Summary

Government intends pursuing a policy of vigorous expansion in the field of natural resources, by encouraging local agriculture, fisheries and forestry, and by extending a welcoming hand to foreign investors in sectors where such investment is needed. Government's two main aims are self-sufficiency, wherever possible, and the expansion of export surpluses. It intends to achieve these aims by providing more capital, more extension services and suitable marketing facilities.

It is hoped that Government's proposals will be acceptable by all as a genuine and sincere attempt to improve the lot of the primary producer, and by so doing, to raise significantly the general standard of living throughout Sierra Leone."

APPENDIX XXVII

SIERRA LEONE WEIGHTS AND MEASURES

The sale of local produce in native markets is almost invariably done by volume. Standard containers which can be readily obtained are used, the commonest being the cigarette tin (cup) and the beer bottle. Larger measures are the four gallon kerosene tin, and the kerosene case, which held two tins. These are no longer readily available since fuel is now principally supplied in 44-gallon drums or in bulk.

Certain measures became standardised by usage for the major agricultural commodities. The avarage weight of a kerosene case, heaped up until no more stayed on, was taken as the basis for the " bushel " weight. The Sierra Leone " bushel " is, therefore, considerably greater than the Imperial bushel. It does not even refer strictly to the older " Colonial " bushel used up to 1900, but to the weights of the lots in which commodities are traditionally traded.

The following tables contain most of the Sierra Leone measures:

Basic Measures of Volume

4 Cigarette cups	1 penny pan
2 Penny pans	1 threepence pan
5 Three pence pans	1 kettle (21 lb. clean rice).
2 Kettles	1 can or tin
2 Cans or tins	1 bushel (84 lb. clean tice).

Standard nett weights per bag

Cocoa	140 lb.
Coffee	132 lb.
Ginger	212–235 lb.
Groundnuts (undecorticated)	77 lb.
Palm Kernels	182½ lb.
Rice (clean)	168 lb.
Rice (paddy)	120 lb. (often 150 lb.)

Bushel " weight "

Benniseed	60 lb.
Chillies (dried peppers)	28 lb.
Groundnuts (undecorticated)	36 lb.
Guinea Corn	84 lb.
Kola nuts (" measure "—8 Kettles)	176 lb.
Maize	72 lb.
Palm Kernels	60 lb.
Rice (clean)	84 lb.
Rice (paddy)	60 lb.

Miscellaneous Measures

" Bundle " of piassava	56 lb.
Bottle—reputed quart	1/6th gallon
Bottle—reputed pint	1/12th gallon
Cigarette cup	8 to 9½ oz. of rice
Kettle (clean rice)	21 lb. (2 gallons approx.)
Tin (or can):—	4 gallons
of honey	48 lb.
of palm oil	38 lb.

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